



DALLAS
OBESITY
SOCIETY

To Engage, Educate, and Empower Obesity Treatment in Dallas-Fort Worth

Obesity as a Treatment Target in Type 2 Diabetes

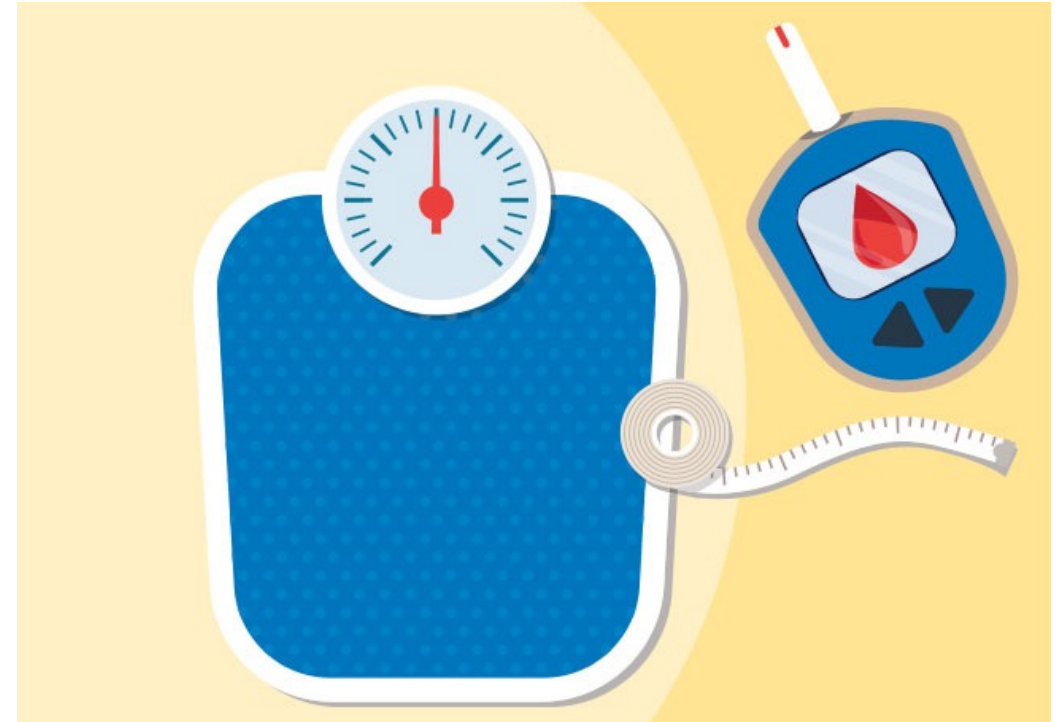
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UTSouthwestern
Weight Wellness

Disclosures

Consultant/Advisory Boards: Novo Nordisk, Boehringer Ingelheim, and Eli Lilly and Company

Case Discussion

Linda Jones

62-year-old accountant recently discharged following NSTEMI and 3 stents to LAD. BMI 42, BP 138/88, HR 64

PMHx

T2D x 9 years (A1c 9.8%), HTN, MAFLD, HLD

Current Meds

Metformin 1000 mg twice daily

Glimepiride 4 mg daily

70/30 Insulin 15 units twice daily *started in hospital

Rosuvastatin 5 -> 20 mg daily

Metoprolol 25 mg twice daily

Losartan 100 mg daily

Clopidogrel 75 mg daily



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OBJECTIVES



Outline the connection between type 2 diabetes (T2D) and obesity



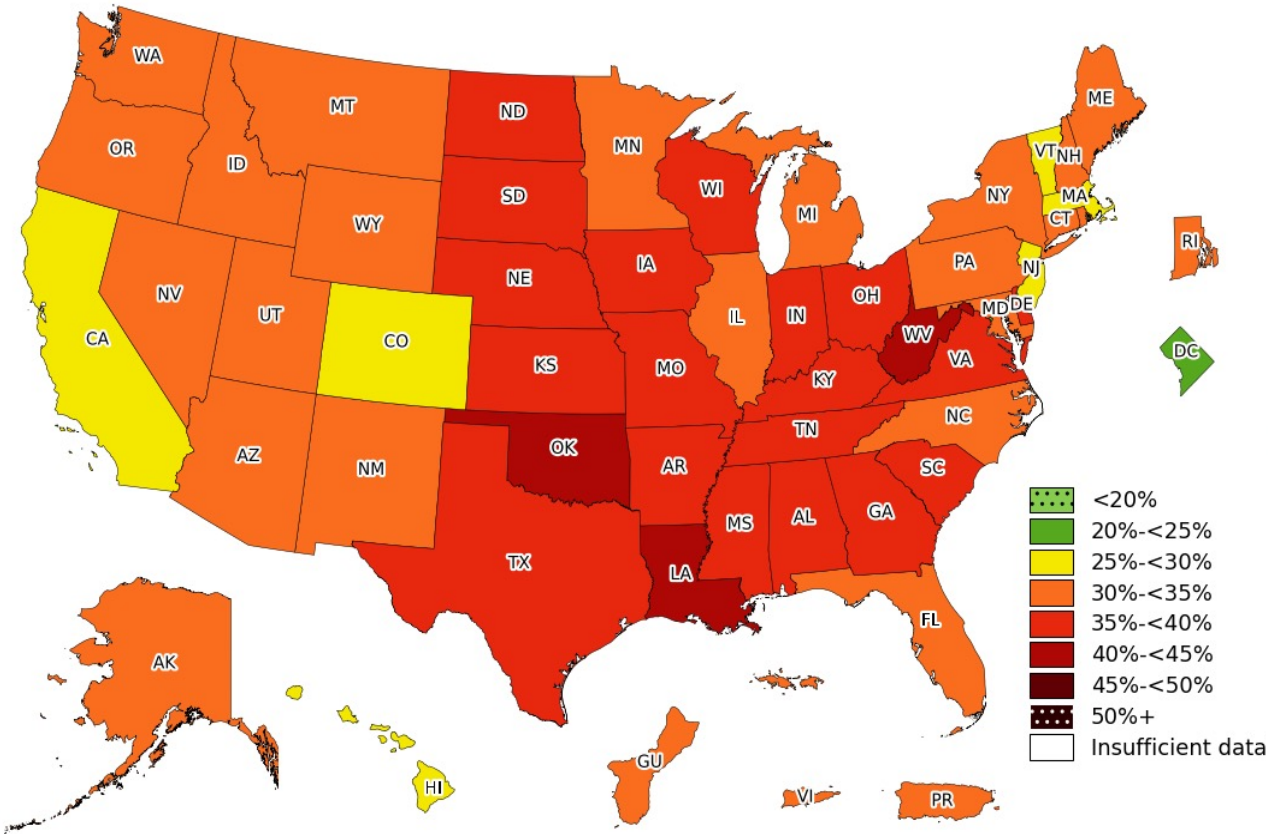
Discuss the role of bariatric surgery and bariatric range weight reduction for treating T2D



Review emerging T2D and obesity medications that result in significant weight reduction

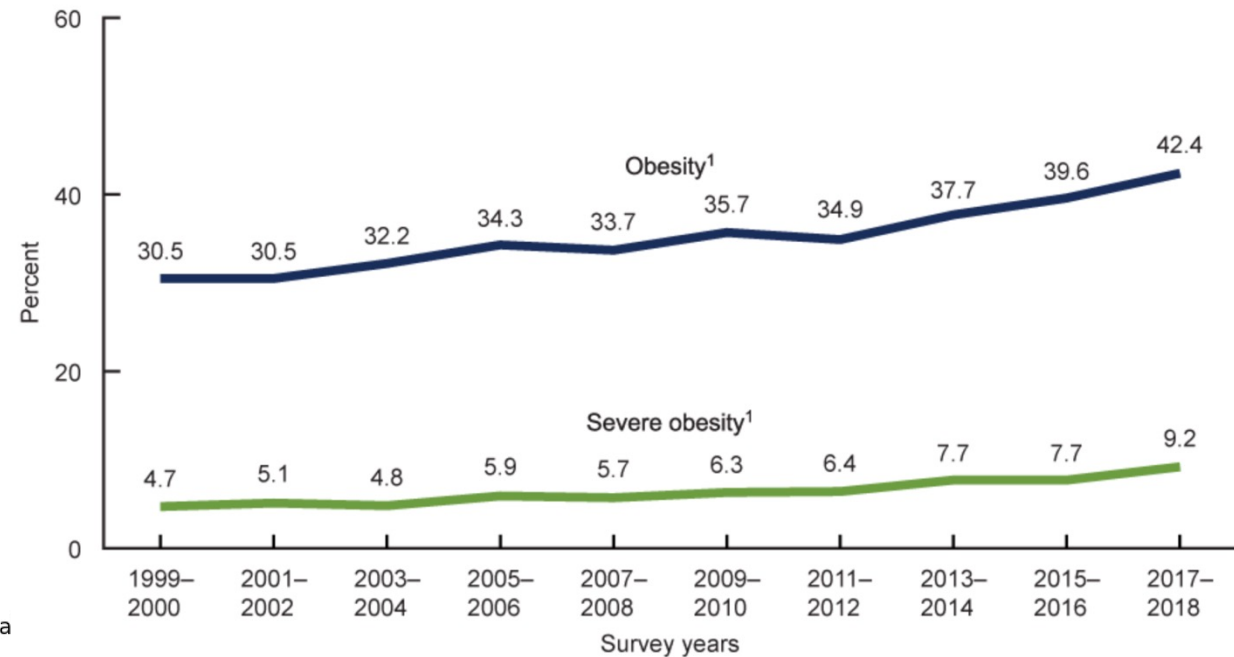
US Obesity Epidemic Grows

Native American, Non-Hispanic Black and Hispanic Groups most affected



Adult Obesity Prevalence Maps. Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity, and Obesity. (21 September 2023).

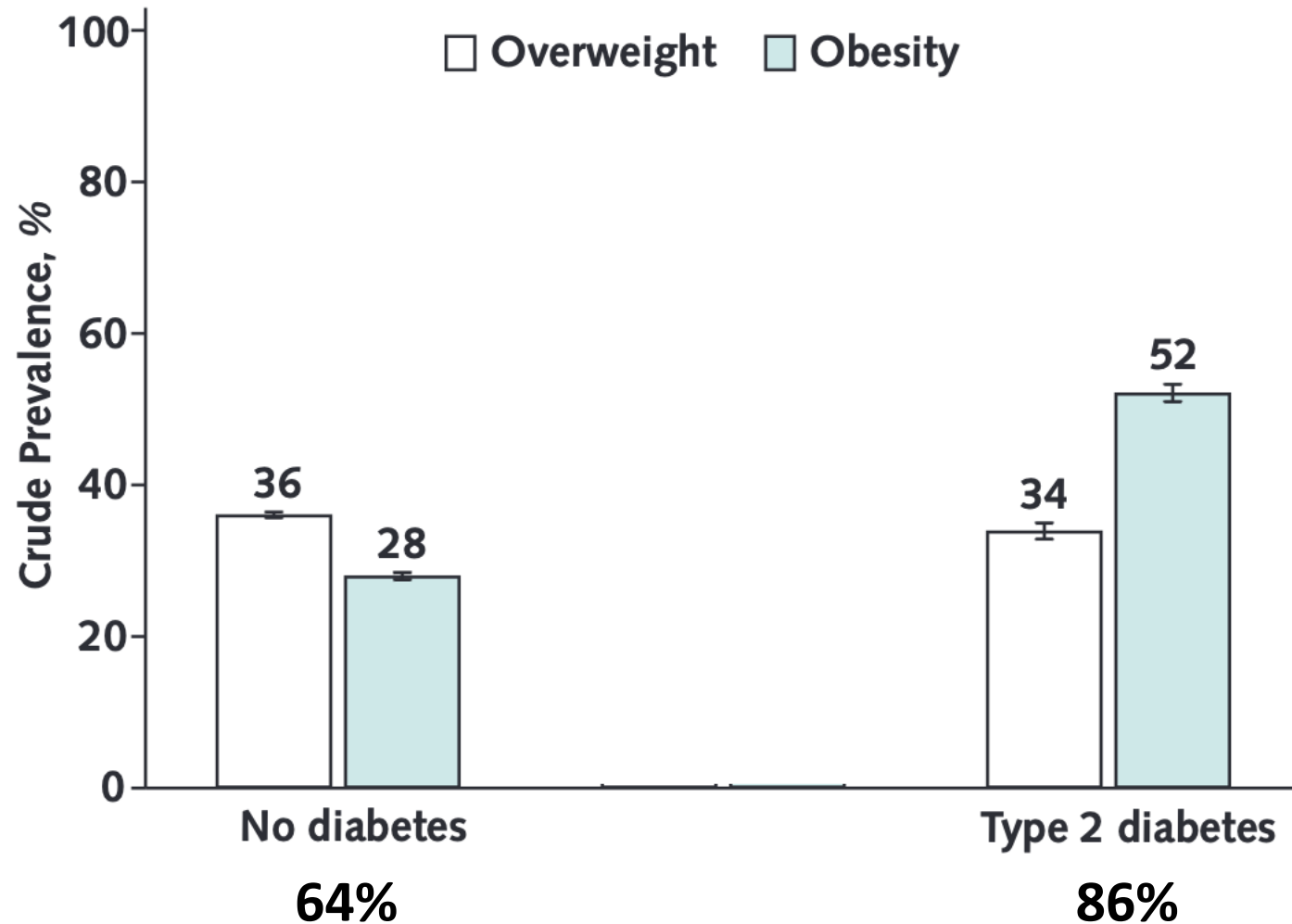
Trends in US Adults with Obesity 2000-2018



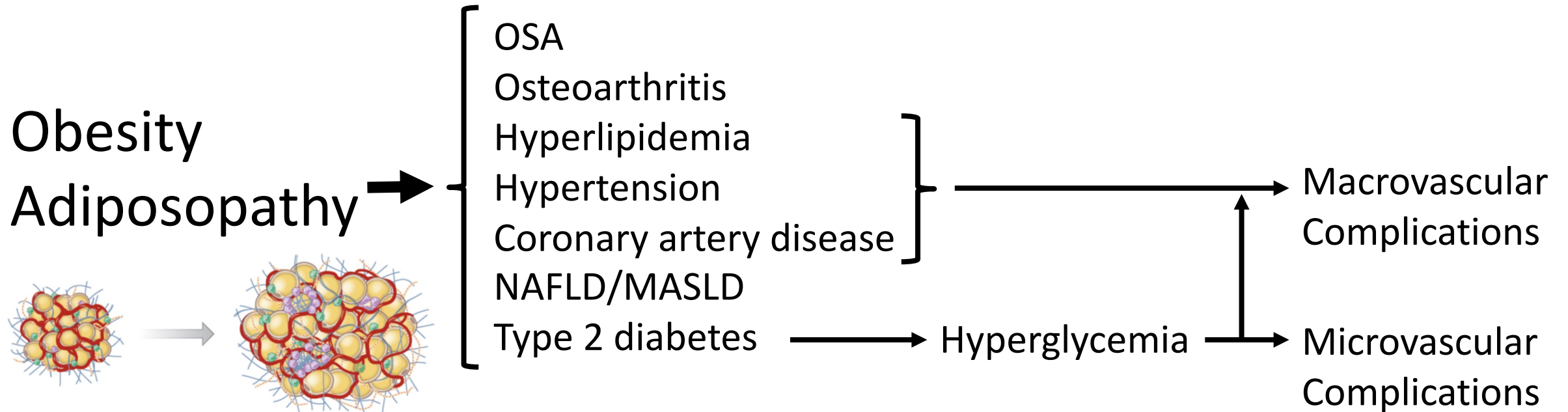
Obesity increased 30.5% to 42.4%

Severe obesity increased 4.7% to 9.2%

Prevalence of overweight and obesity in US adults by diabetes status: NHIS, 2016 to 2020



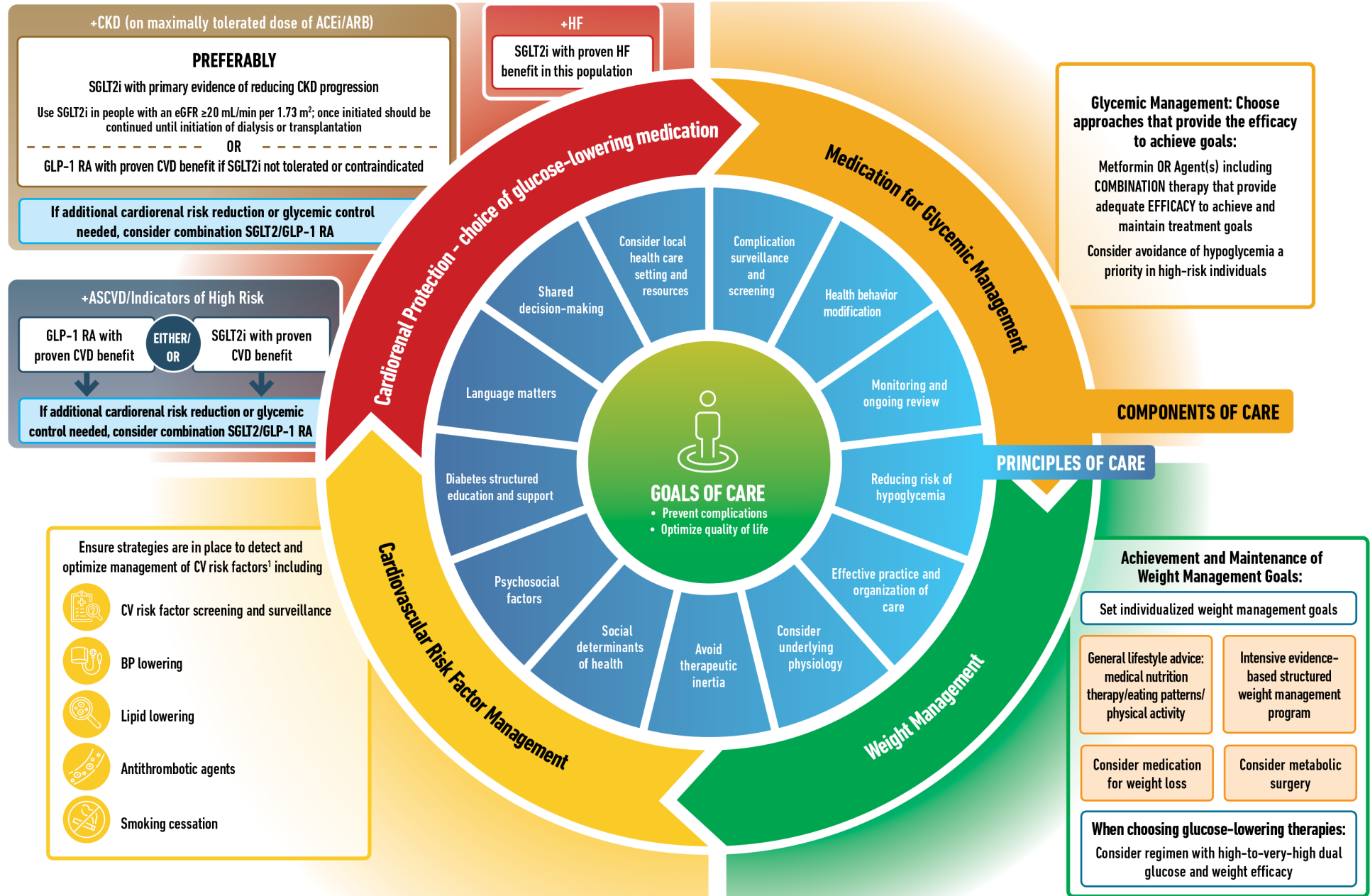
Treating Adiposity or Its Downstream Complications



Weight-centric approach
Upstream intervention

Glucocentric approach
Downstream intervention

HOLISTIC PERSON-CENTERED APPROACH TO T2DM MANAGEMENT



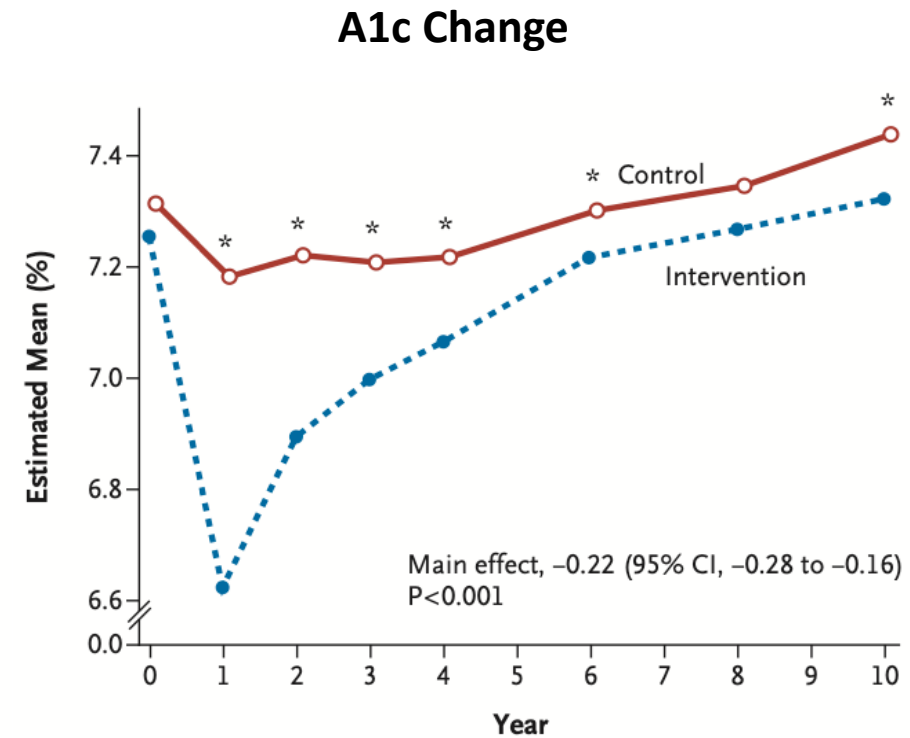
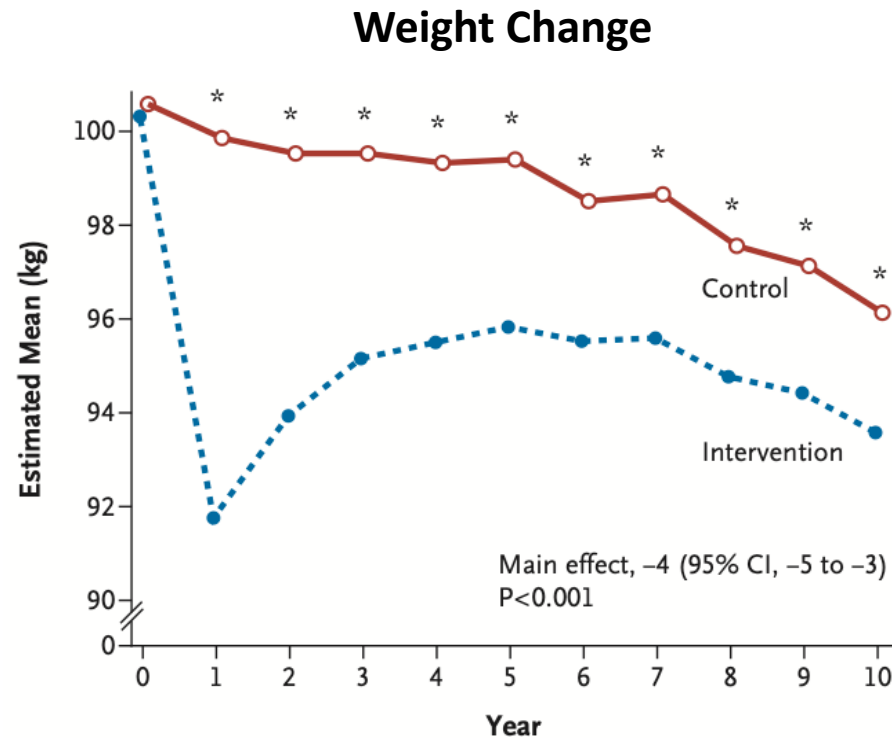
Weight Loss in T2D and CV Events Reduction

Look AHEAD

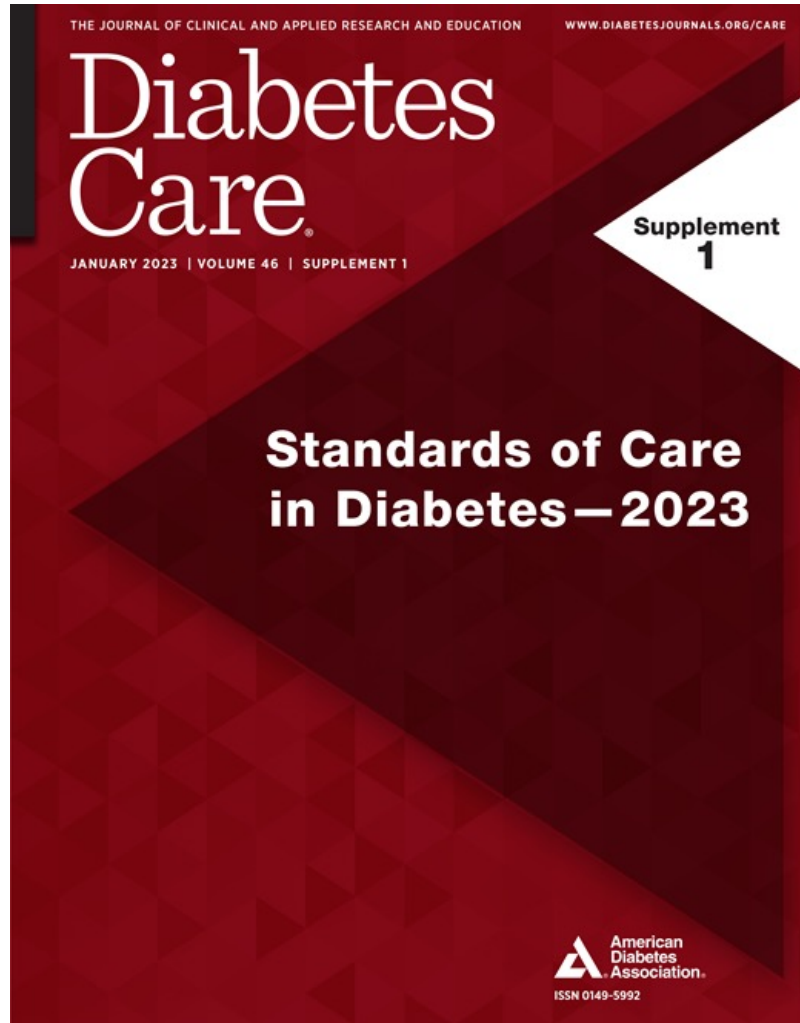
Weight loss of 8.6% at 1 yr
No reduction CV death, MACE

Post-hoc Analysis

Those with $\geq 10\%$ weight loss
- 20% lower CV mortality
- 21% lower MACE

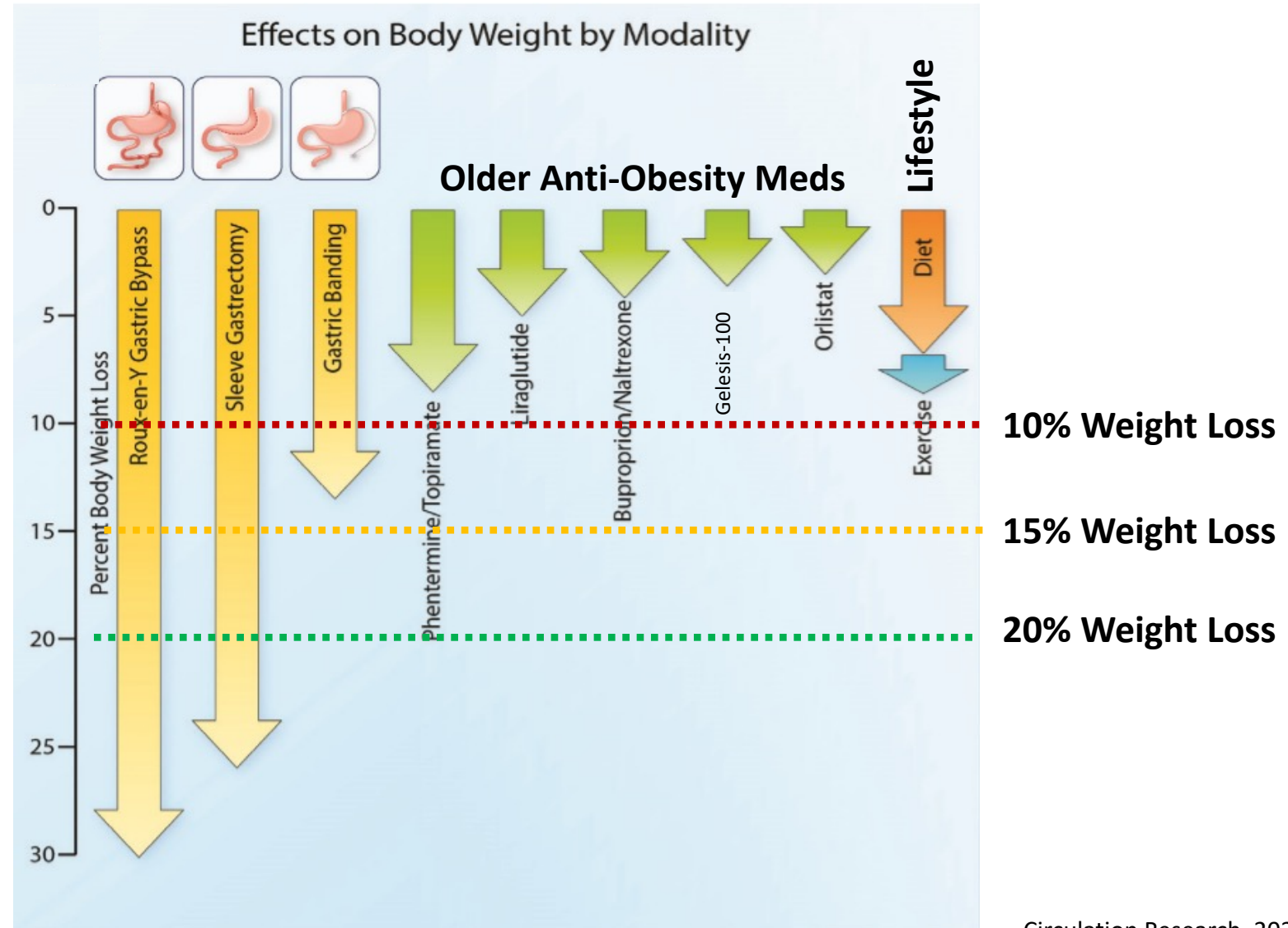


Focus on Obesity



8.5 Individuals with diabetes and overweight or obesity may benefit from modest or larger magnitudes of weight loss. Relatively small weight loss (approximately 3–7% of baseline weight) improves glycemia and other intermediate cardiovascular risk factors. **A** Larger, sustained weight losses (>10%) usually confer greater benefits, including disease-modifying effects and possible remission of type 2 diabetes, and may improve long-term cardiovascular outcomes and mortality. **B**

Clinically Significant Weight Reduction is not Easy



Bariatric Surgery Criteria and Weight Reduction

Bariatric Surgery BMI Criteria

NIH Consensus Statement

BMI <35

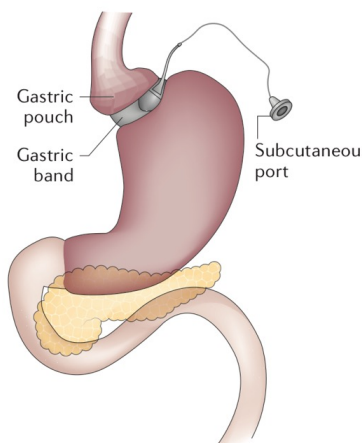
BMI 35-39
+ 1 comorbidity

BMI >40

Comorbidities

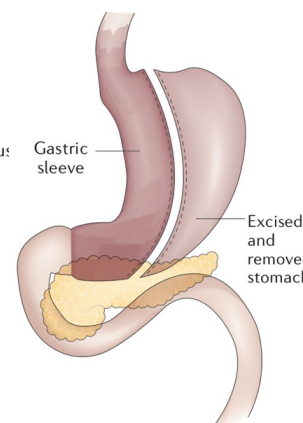
Type 2 diabetes
Obstructive Sleep apnea
Hypertension
Atherosclerotic disease
Hyperlipidemia
Fatty liver disease

Adjustable
Gastric Banding



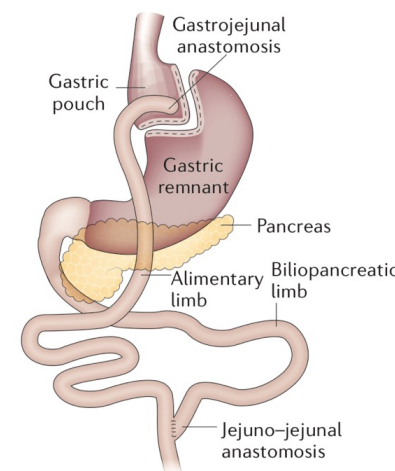
15%[¶]

Sleeve
Gastrectomy



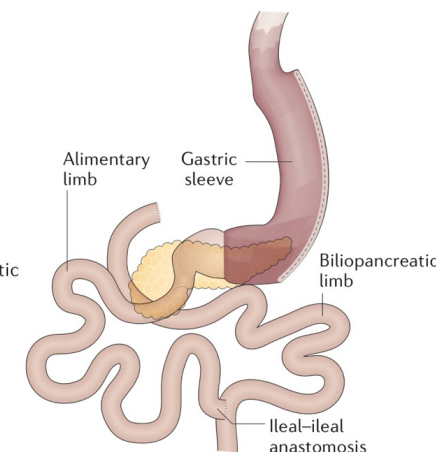
21.1%[§]

Roux-en-Y
Gastric Bypass



24.5%[§]

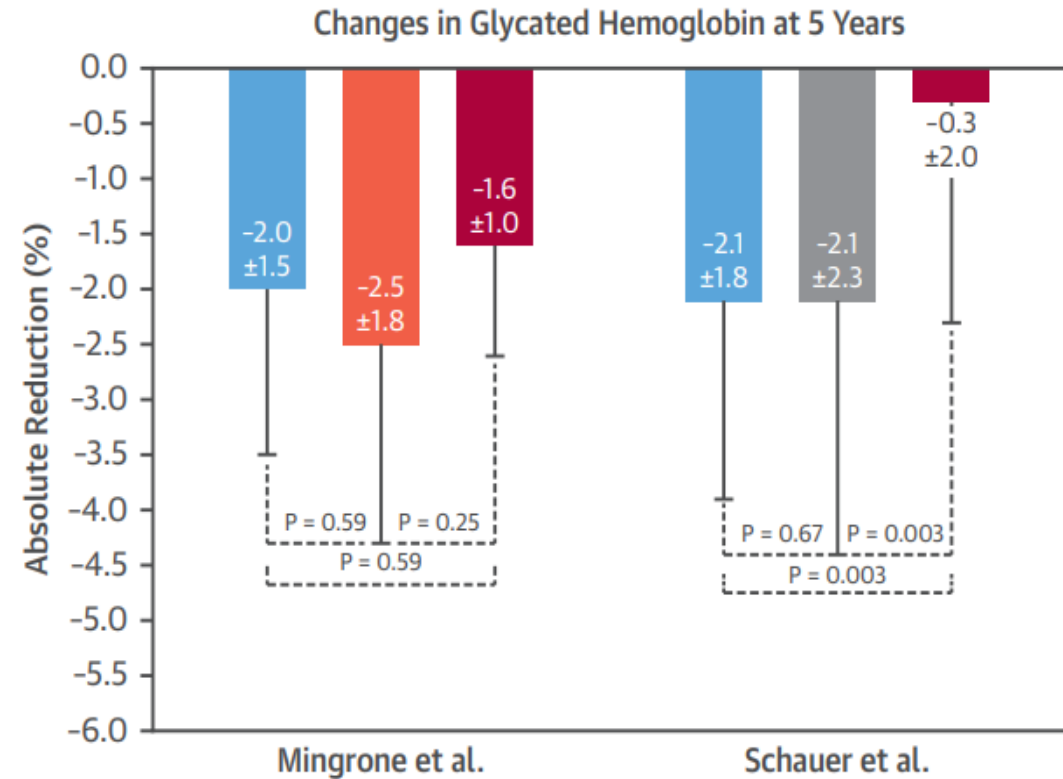
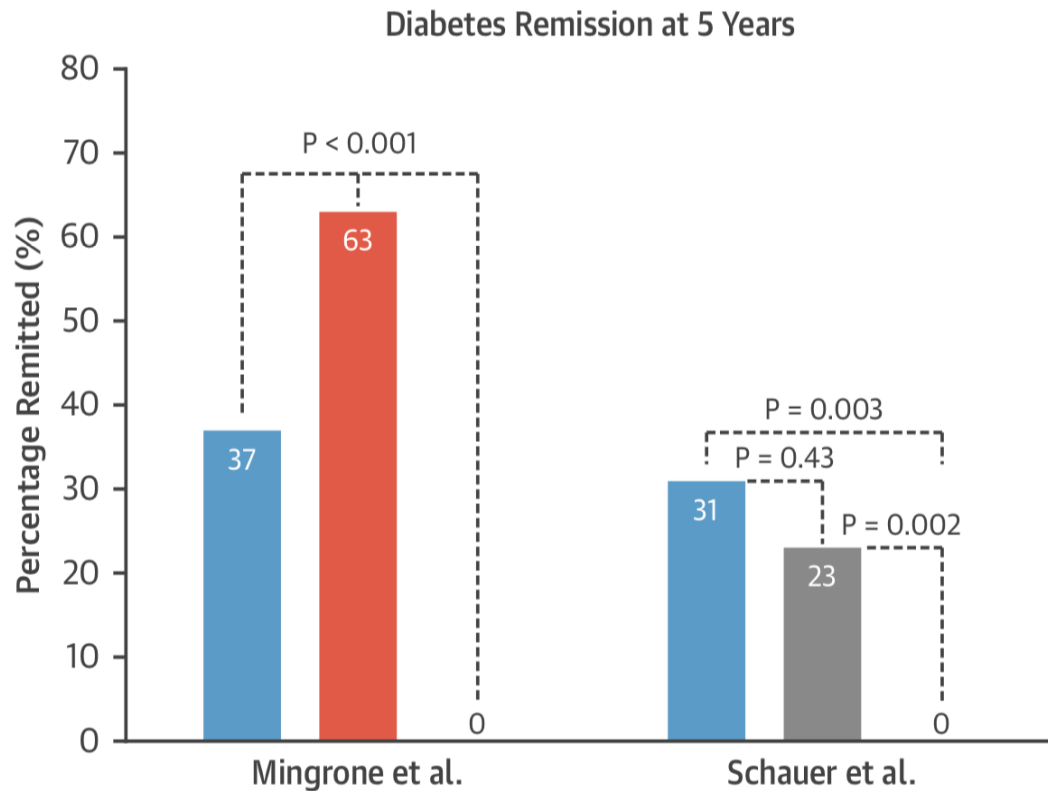
Biliopancreatic Diversion
w/ Duodenal Switch



33.82%[¶]

Weight Loss Outcomes

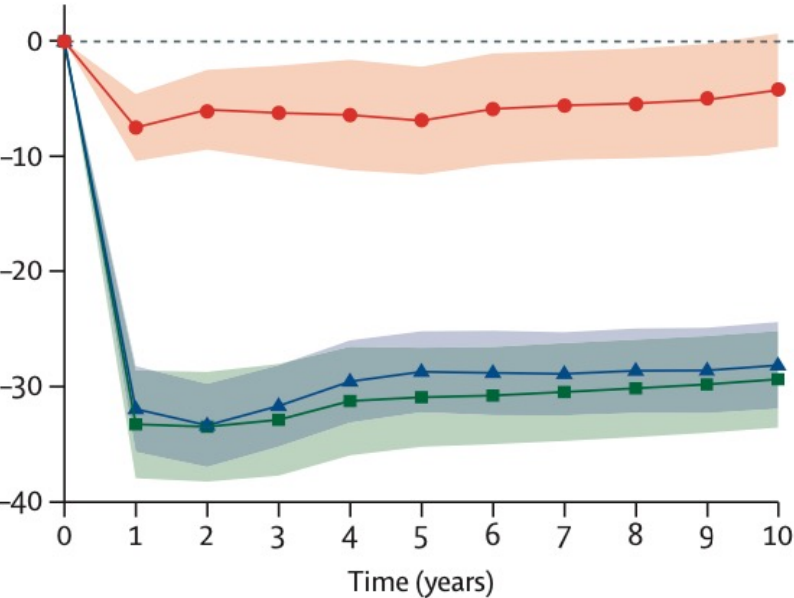
T2D Remission and A1c at 5 years Post-MBS



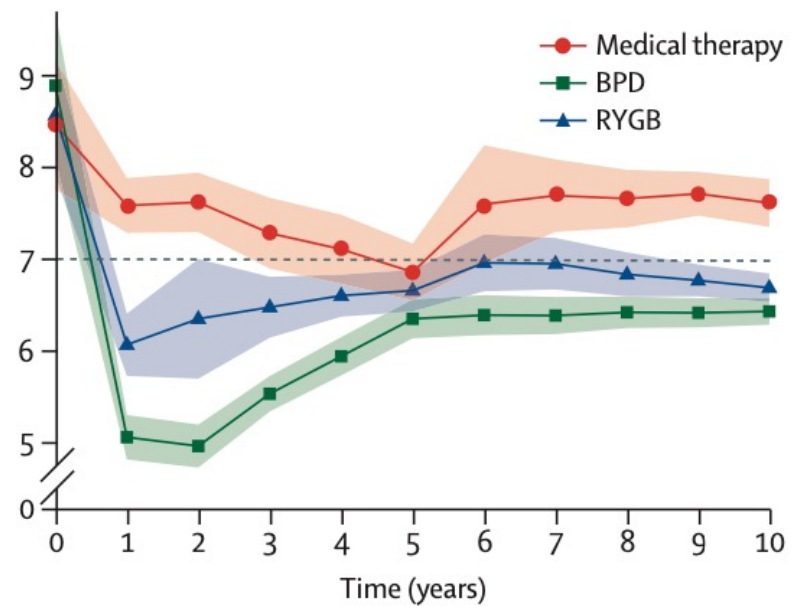
RYGB BPD SG Medical Therapy

T2D Complications 10 years Post-RYGB, BPD

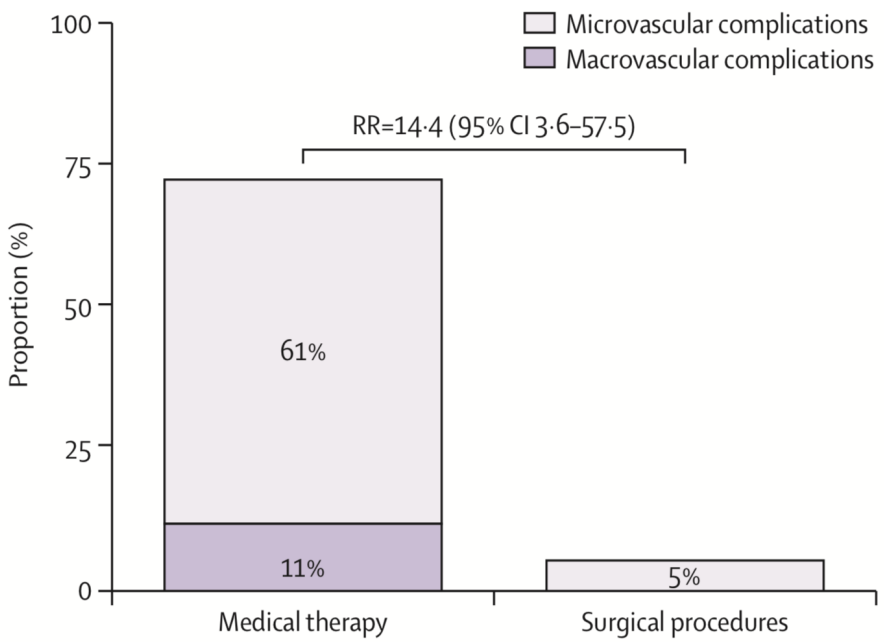
Weight Change



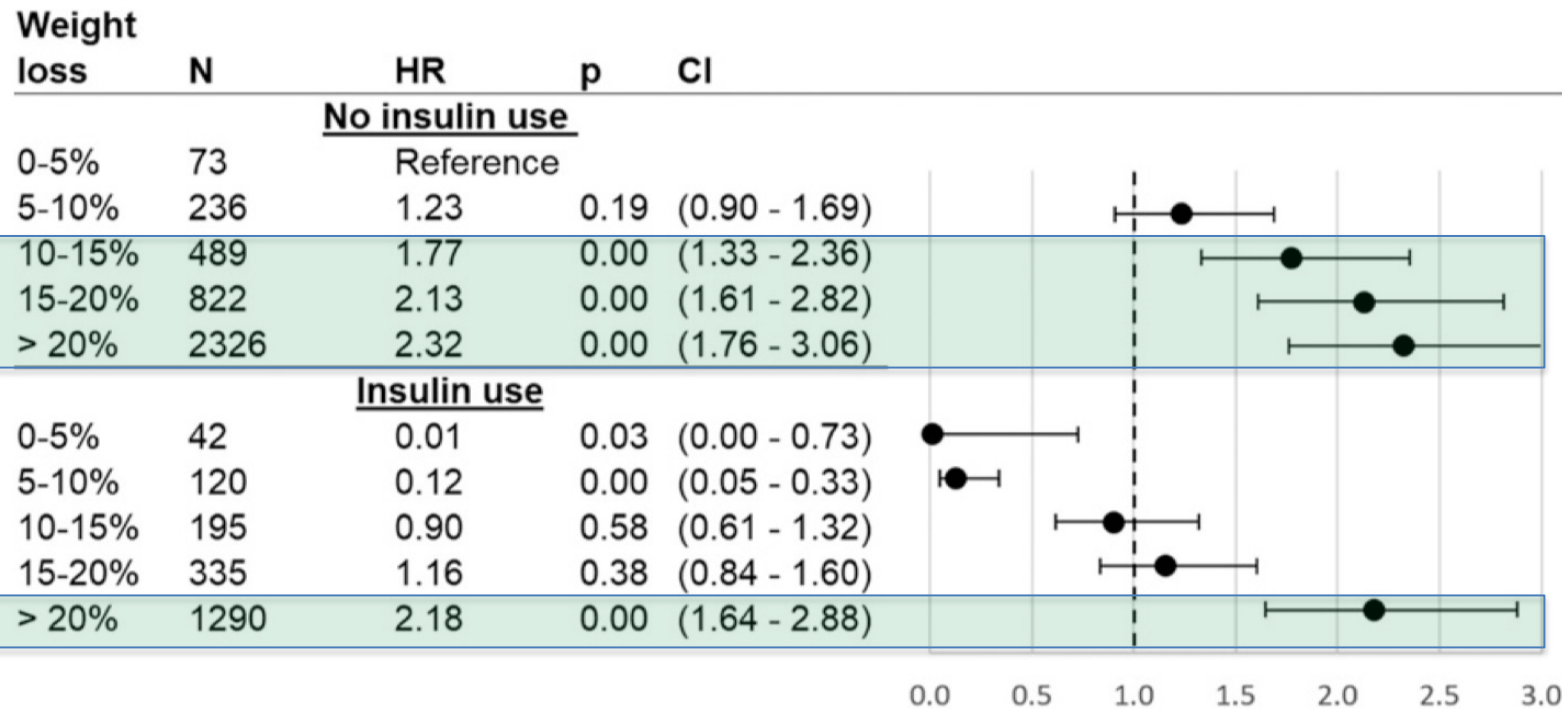
A1c Change



T2D Complications at 10 Years



Predictors of T2D Remission after MBS

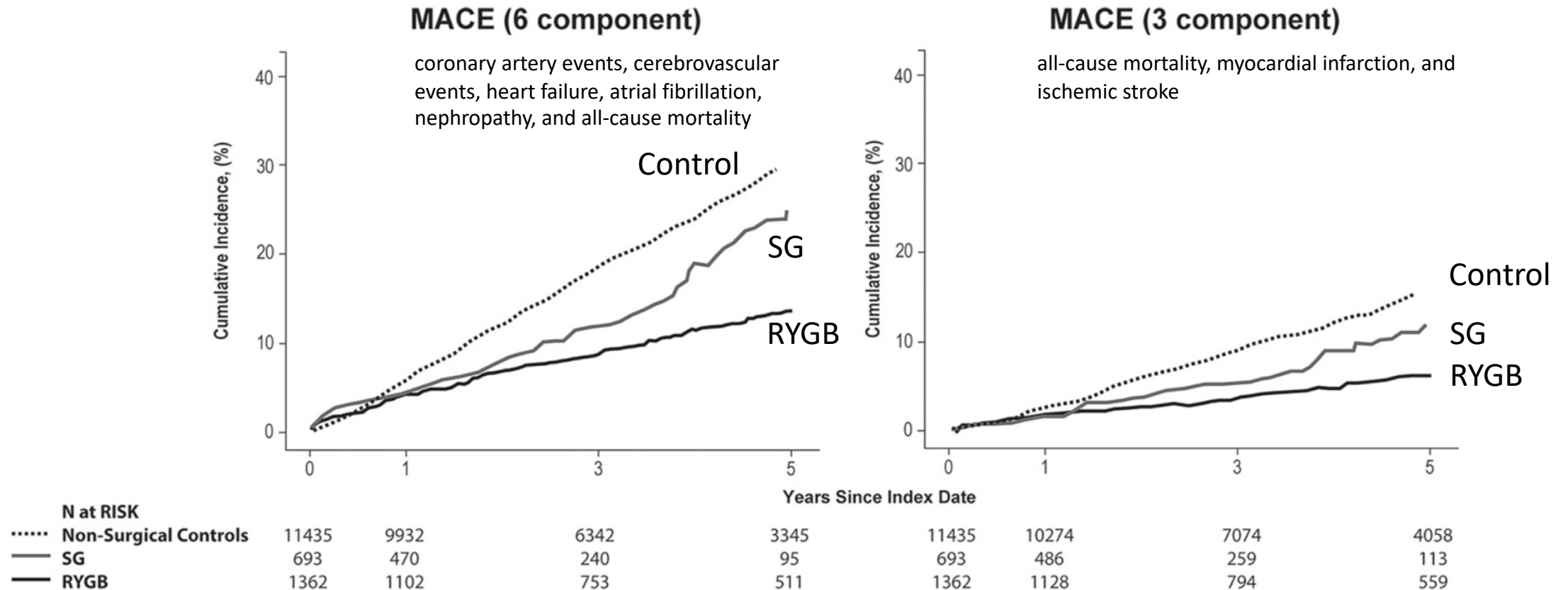


T2DM Remission Predictors

- Weight loss
- Shorter T2DM duration
- Good pre-op control
- Not on insulin
- Younger age
- Smaller waist circumference
- Presence of NAFLD

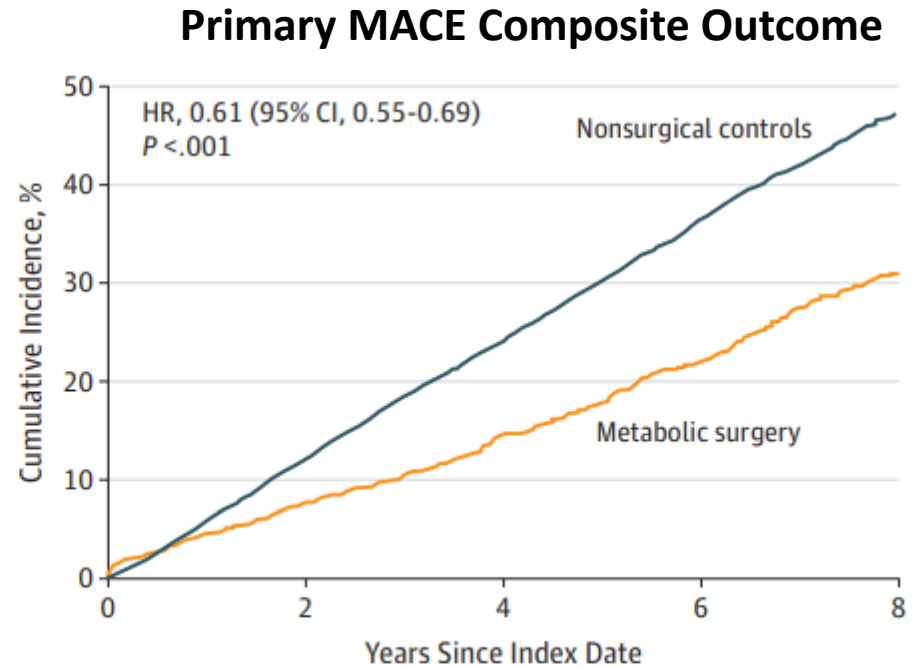
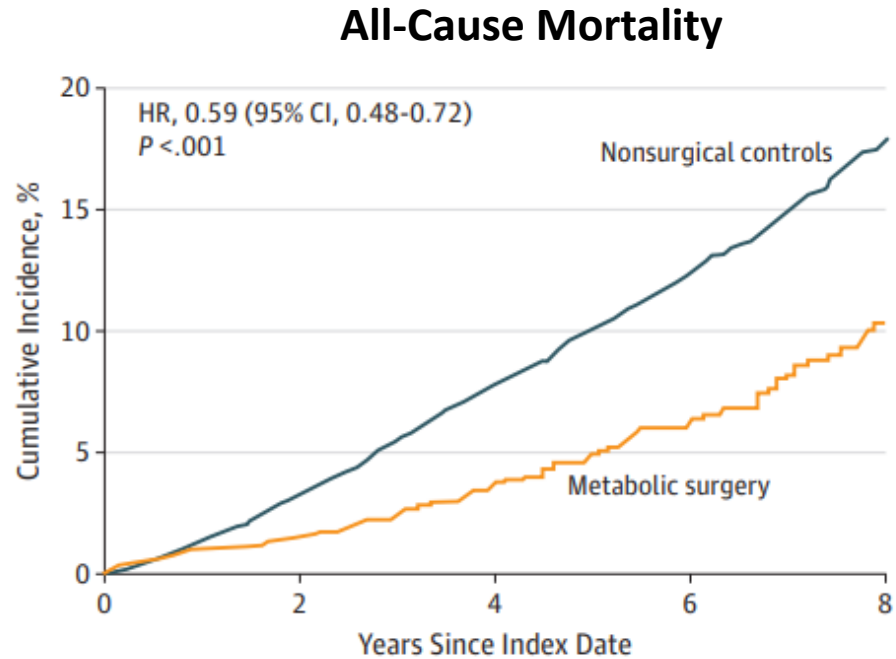
Cardiovascular Outcomes in Type 2 Diabetes

Comparison of Gastric Bypass, Sleeve Gastrectomy, and Usual Care



RYGB may be associated with greater weight loss, better glycemic control, and lower risk of MACE and nephropathy vs. sleeve gastrectomy

Bariatric Surgery in T2D - Associated with Lower Mortality and MACE



No. at risk	0	2	4	6	8
Nonsurgical controls	11435	8050	4791	2244	838
Metabolic surgery	2287	1372	910	535	293

MACE composite of 6 outcomes:

First occurrence of coronary artery events, cerebrovascular events, heart failure, atrial fibrillation, nephropathy, and all-cause mortality



8. Obesity and Weight Management for the Prevention and Treatment of Type 2 Diabetes: *Standards of Care in Diabetes—2023*

Diabetes Care 2023;46(Suppl. 1):S128–S139 | <https://doi.org/10.2337/dc23-S008>

Nuha A. ElSayed, Grazia Aleppo, Vanita R. Arora, Raveendhara R. Bannuru, Florence M. Brown, Dennis Bruemmer, Billy S. Collins, Marisa E. Hilliard, Diana Isaacs, Eric L. Johnson, Scott Kahan, Kamlesh Khunti, Jose Leon, Sarah K. Lyons, Mary Lou Perry, Priya Prahalad, Richard E. Pratley, Jane Jeffrie Seley, Robert C. Stanton, and Robert A. Gabbay, on behalf of the American Diabetes Association

The American Diabetes Association (ADA) “Standards of Care in Diabetes” includes the ADA’s current clinical practice recommendations and is intended to provide the components of diabetes care, general treatment goals and guidelines, and tools to evaluate quality of care. Members of the ADA Professional Practice Committee, a multidisciplinary expert committee, are responsible for updating the Standards of Care annually, or more frequently as warranted. For a detailed description of ADA standards, statements, and reports, as well as the evidence-grading system for ADA’s clinical practice recommendations and a full list of Professional Practice Committee members, please refer to Introduction and Methodology. Readers who wish to comment on the Standards of Care are invited to do so at professional.diabetes.org/SOC.

Obesity is a chronic and often progressive disease with numerous medical, physical, and psychosocial complications, including a substantially increased risk for type 2 diabetes (1). There is strong and consistent evidence that obesity management can delay the progression from prediabetes to type 2 diabetes (2–6) and is highly beneficial in treating type 2 diabetes (7–18). In people with type 2 diabetes and overweight or obesity, modest weight loss improves glycemia and reduces the need for glucose-lowering medications (7–9), and larger weight loss substantially reduces A1C and fasting glucose and has been shown to promote sustained diabetes remission through at least 2 years (11,19–23). Several modalities, including intensive behavioral counseling, obesity pharmacotherapy, and bariatric surgery, may aid in achieving and maintaining meaningful weight loss and reducing obesity-associated health risks. Metabolic surgery strongly improves glycemia and often leads to remission of diabetes, improved quality of life, improved cardiovascular outcomes, and reduced mortality. The importance of addressing obesity is further heightened by numerous studies showing that both obesity and diabetes **increase** the risk for more severe coronavirus disease 2019 (COVID-19) infections (24–27). This section aims to provide evidence-based recommendations for obesity management, including behavioral, pharmacologic, and surgical interventions, in people with type 2 diabetes and in those at risk. This section focuses on obesity management in adults; further discussion on obesity in older individuals and children can be found in Section 13, “Older Adults,” and Section 14, “Children and Adolescents,” respectively.

Disclosure information for each author is available at <https://doi.org/10.2337/dc23-S015>.
Suggested citation: ElSayed NA, Aleppo G, Arora VR, et al., American Diabetes Association. 8. Obesity and weight management for the prevention and treatment of type 2 diabetes: Standards of Care in Diabetes—2023. *Diabetes Care* 2023;46(Suppl. 1):S128–S139

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ADA Standards of Care 2023

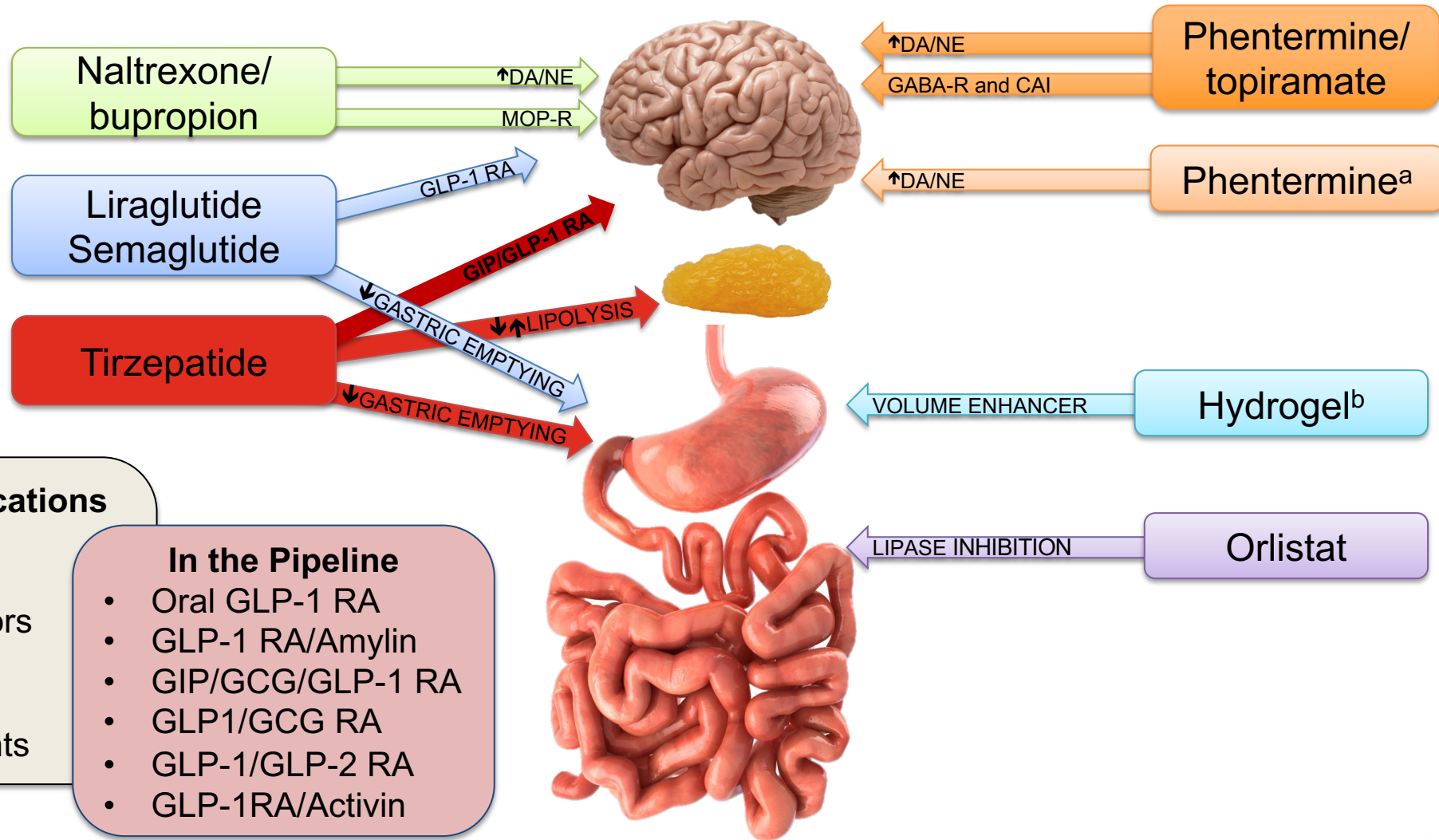
Obesity and Weight Management for the Prevention and Treatment of Type 2 Diabetes

Metabolic surgery should be a recommended option to treat type 2 diabetes in adults with BMI 35.0–39.9 kg/m² (32.5–37.4 kg/m² in Asian American individuals) who do not achieve durable weight loss with nonsurgical methods

Metabolic surgery may be considered as an option to treat type 2 diabetes in adults with BMI 30.0–34.9 kg/m² (27.5–32.4 kg/m² in Asian American individuals) who do not achieve durable weight loss with nonsurgical methods

FDA-Approved Anti-Obesity Medications

BMI ≥ 30 or ≥ 27 kg/m² + ≥ 1 complication



Off-Label Medications

- Metformin
- GLP-1 RAs
- SGLT2 inhibitors
- Topiramate
- Bupropion
- Other stimulants

In the Pipeline

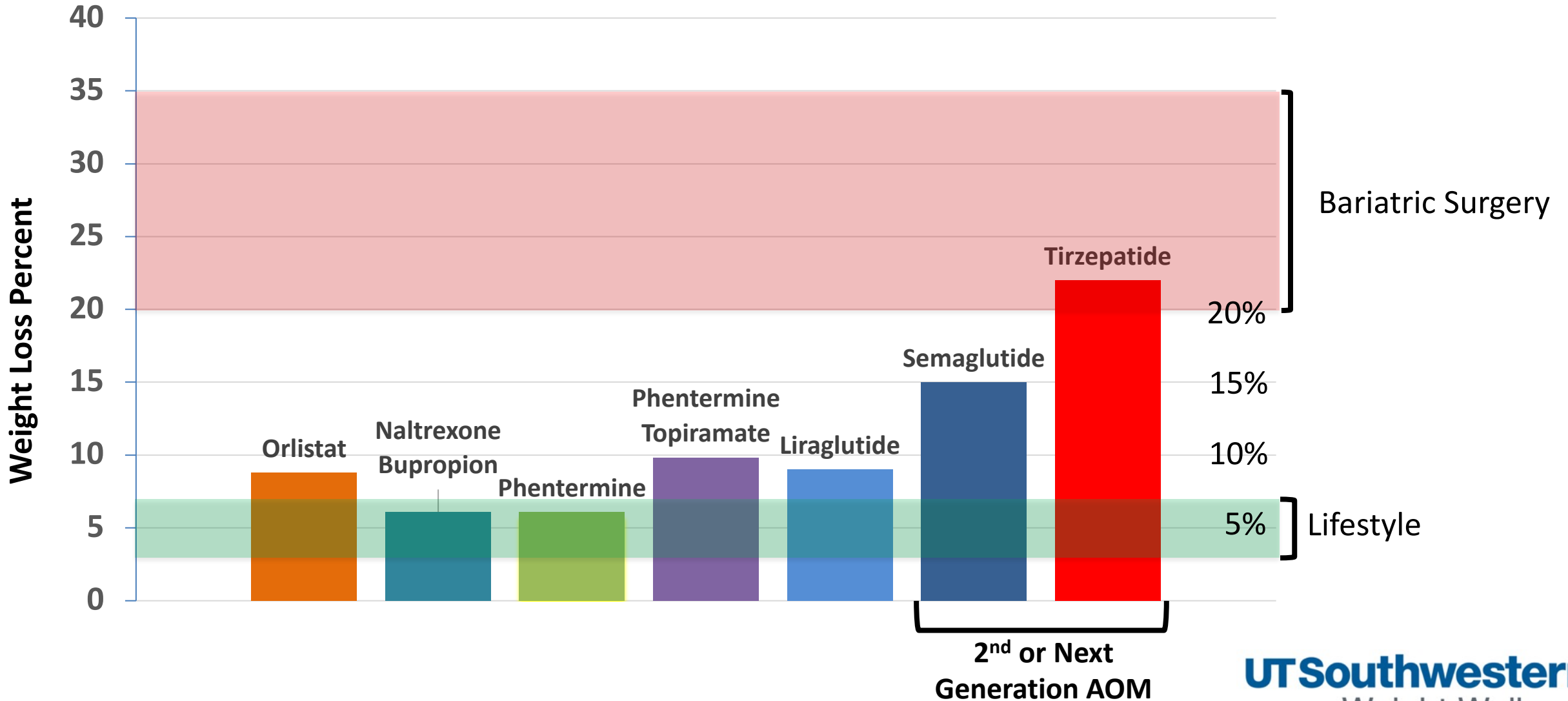
- Oral GLP-1 RA
- GLP-1 RA/Amylin
- GIP/GCG/GLP-1 RA
- GLP1/GCG RA
- GLP-1/GLP-2 RA
- GLP-1RA/Activin

^a Approved for short-term use only. ^b Considered a medical device not a medication, because it does not act systemically.

1. Tak YJ, Lee SY. *Curr Obes Rep.* 2021;10:14-30. 2. Giruzzi N. *Clin Diabetes.* 2020;38:313-314. 3. Angelidi AM et al. *Endocr Rev.* 2022;43:507-557.

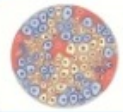
4. Brandt SJ et al. *Peptides.* 2018;100:190-201. 5. Tschöp M et al. *Diabetologia.* 2023 May 20. Online ahead of print.

Effectiveness of Anti-Obesity Medications vs. Lifestyle and Bariatric Surgery for Treating Obesity



Multi-Receptor Agonism for T2D and Obesity

GLP-1



↑ Insulin secretion

↓ Glucagon secretion

↓ Glucose



↓ Gastric emptying rate

↓ Postprandial glucose



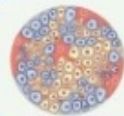
↑ Satiety

↓ Body weight



↓ Risk for CVD

GIP



↑ Insulin secretion

↓ Glucose



↑ Lipogenesis, lipid uptake

↑↓ Lipolysis

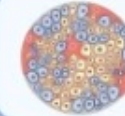


↓ Food intake, body weight



↓ Gastric acid secretion

Glucagon



↑ Insulin secretion



↑ Energy expenditure



↑ Gluconeogenesis

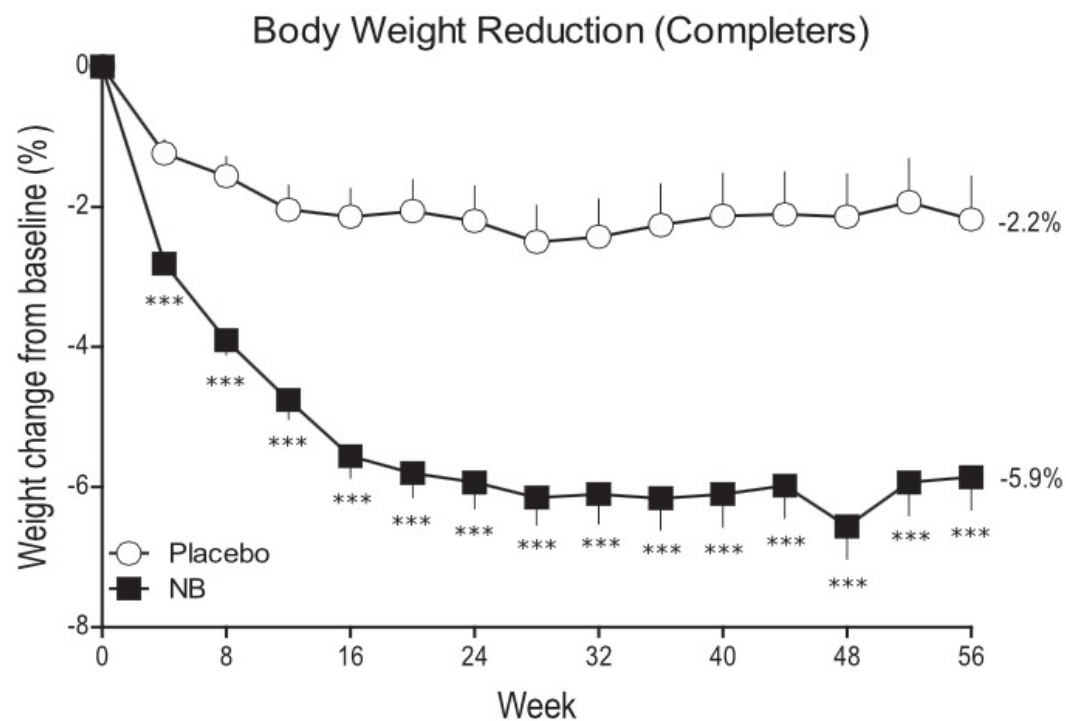
↓ Lipogenesis

↑ Lipolysis

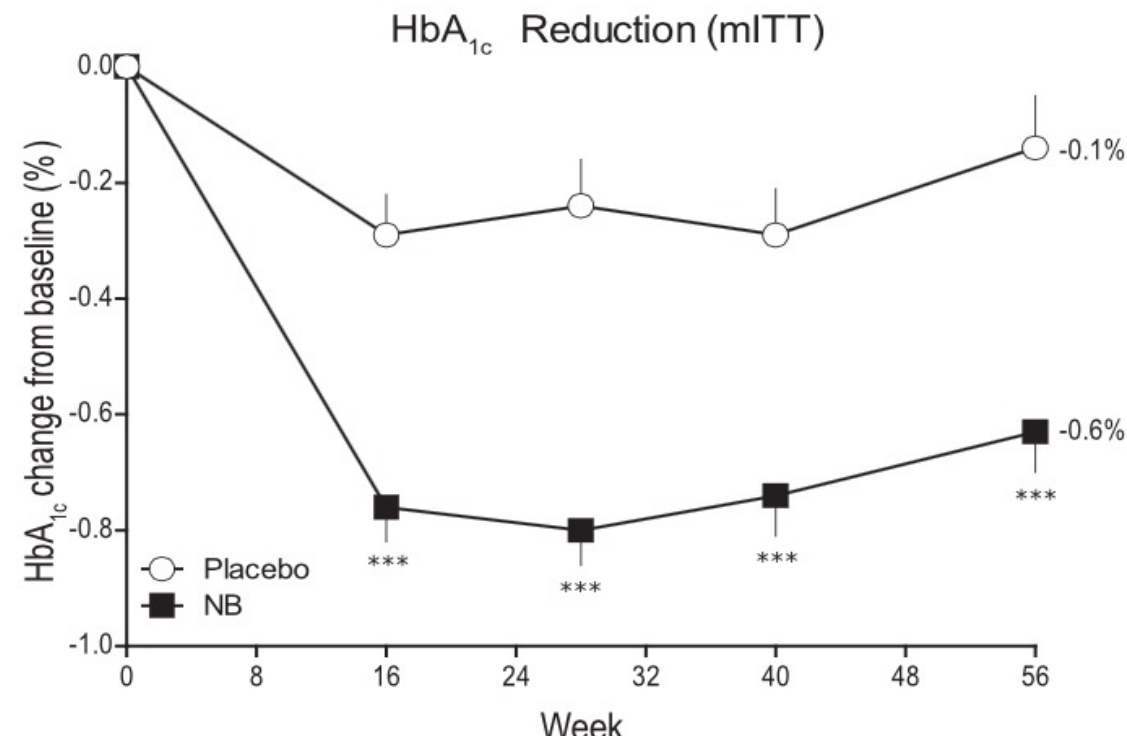


↓ Food intake, body weight

Naltrexone/Bupropion in People with T2DM

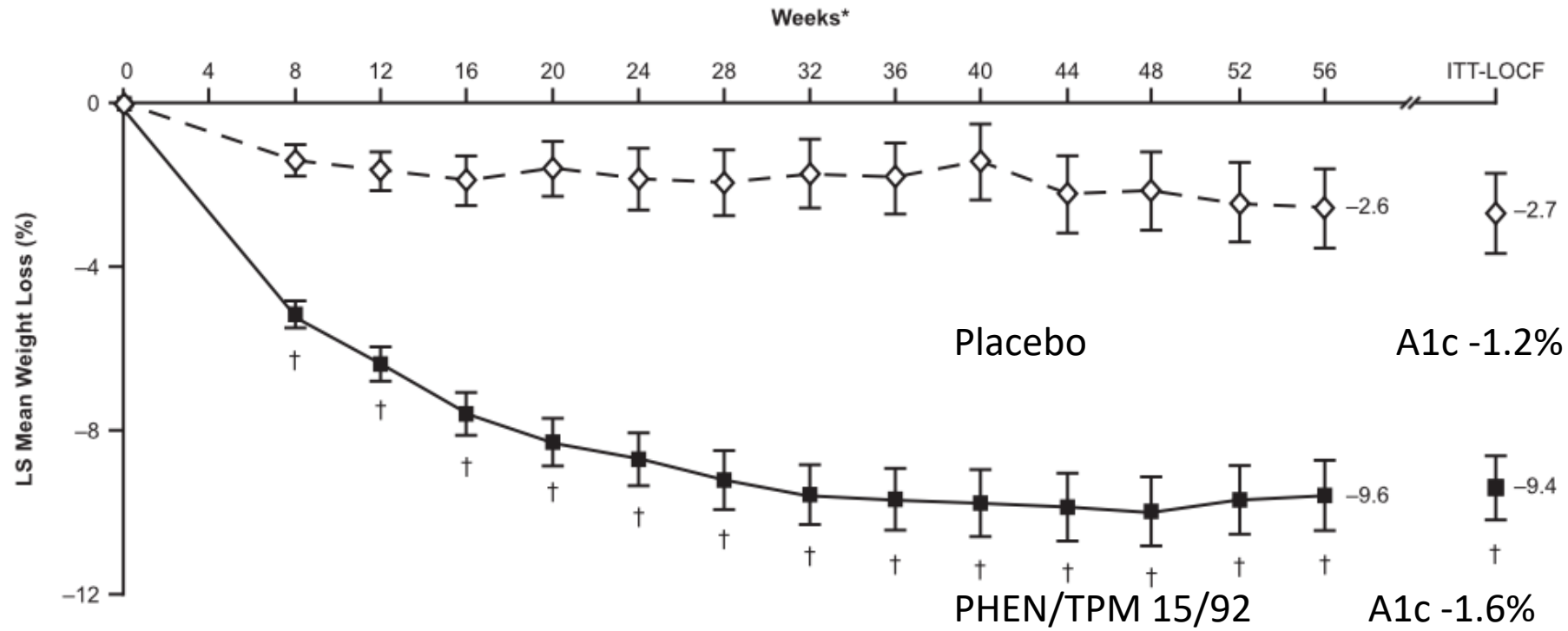


Weight Loss at Week 56	Placebo (% subjects)	NB (% subjects)
≥ 5%	24.0	53.1***
≥ 10%	8.0	26.3***



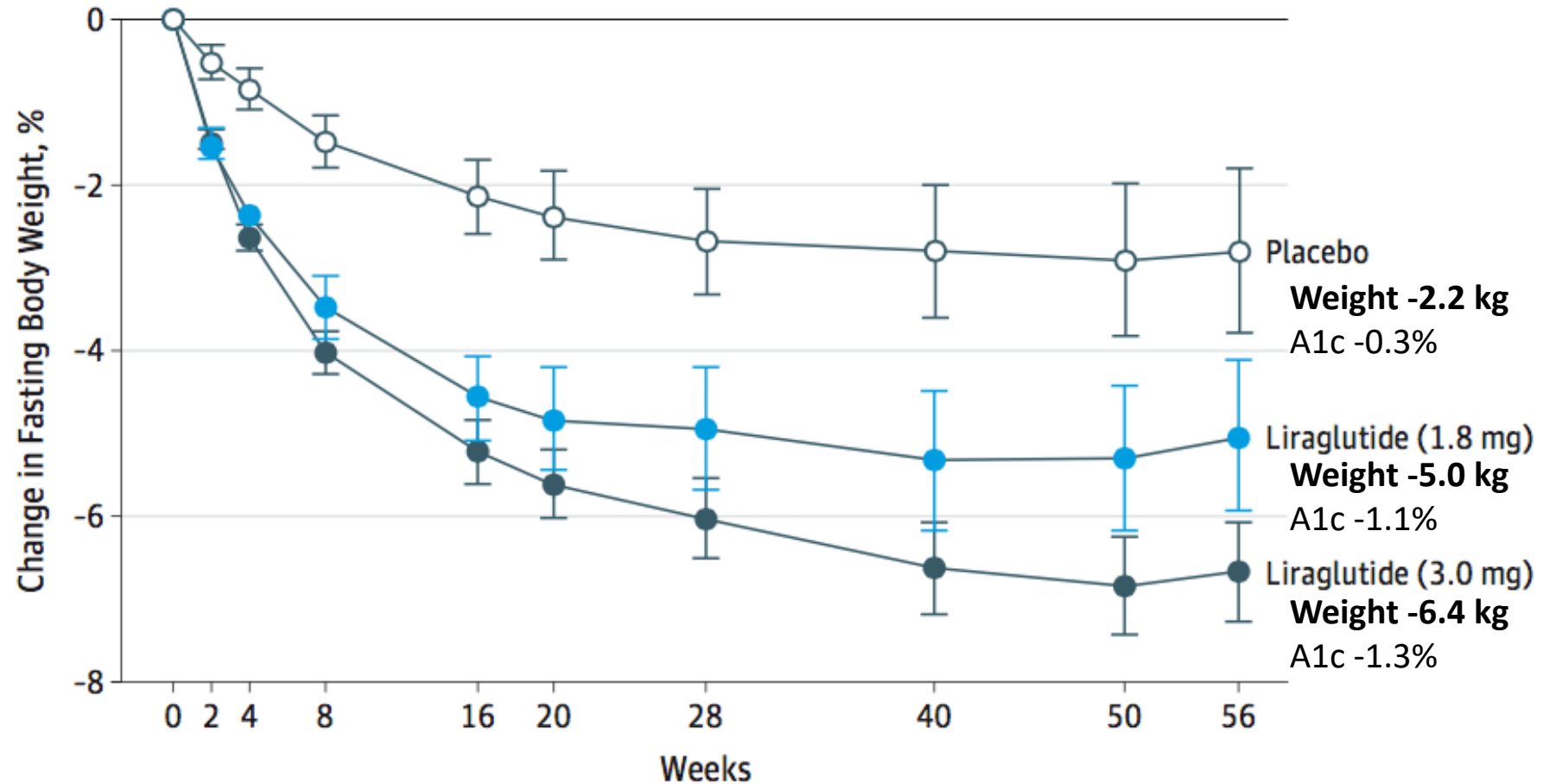
HbA _{1c} Target at Week 56	Placebo (% subjects)	NB (% subjects)
< 7%	26.3	44.1***
< 6.5%	10.2	20.7**

Phentermine Topiramate ER in T2DM



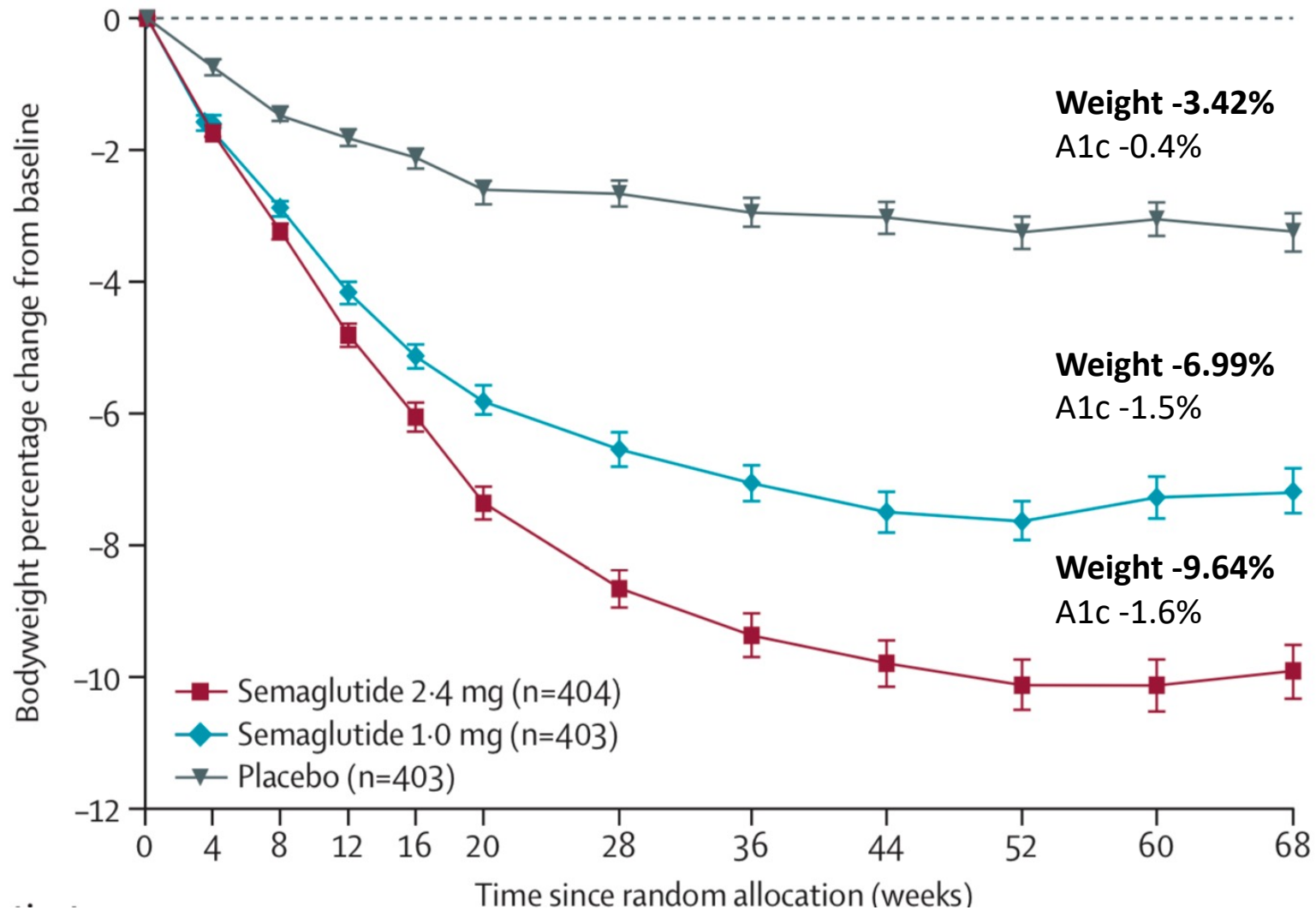
mITT, n	8	12	16	20	24	28	32	36	40	44	48	52	56	ITT-LOCF
Placebo	52	51	52	52	52	52	52	52	52	52	52	51	52	55
PHEN/TPM ER 15/92	68	68	68	68	68	68	68	68	68	68	66	68	68	75

Liraglutide 1.8 and 3 mg in People with T2DM SCALE Diabetes



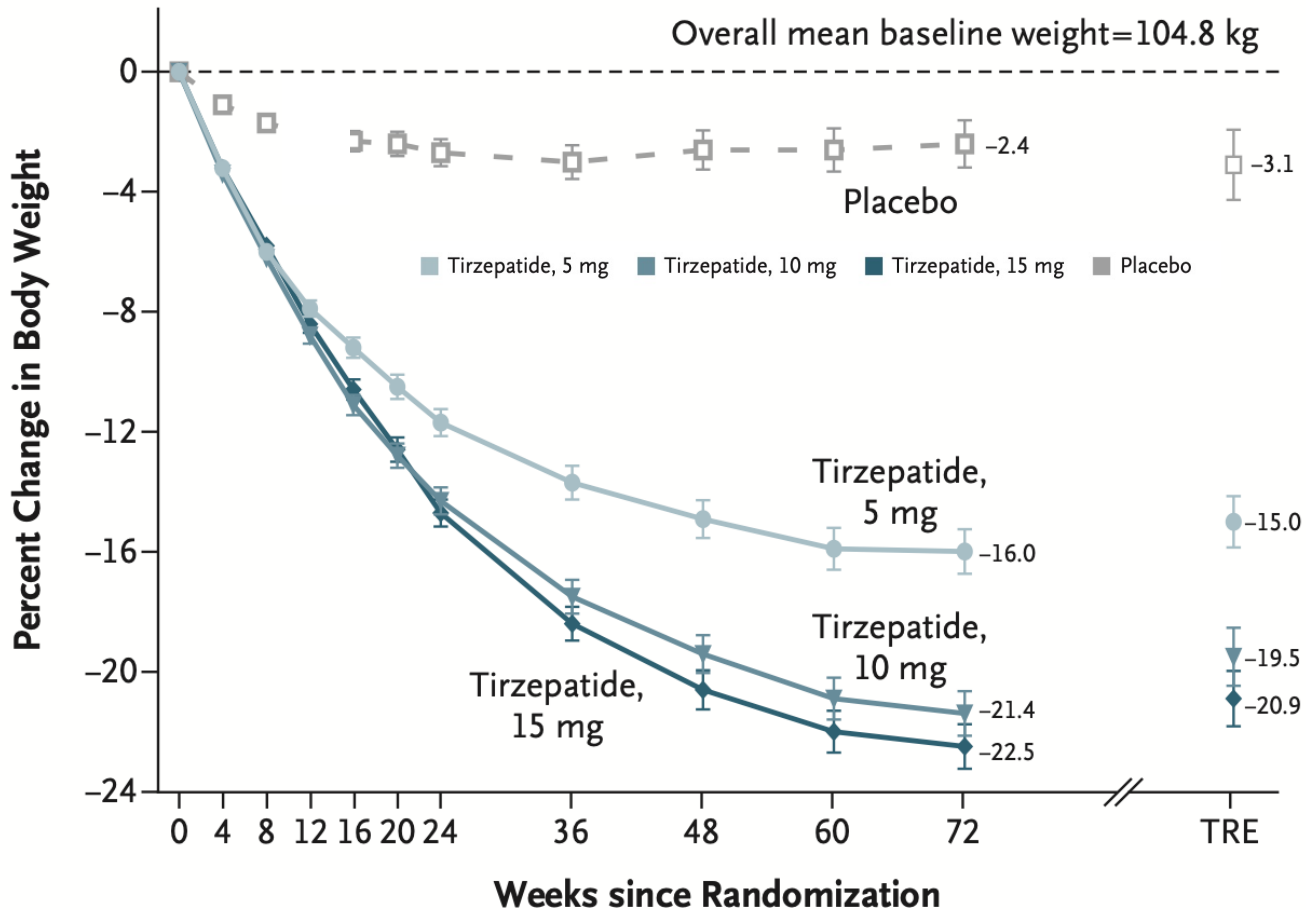
Semaglutide 2.4 mg in People with T2DM

STEP-2

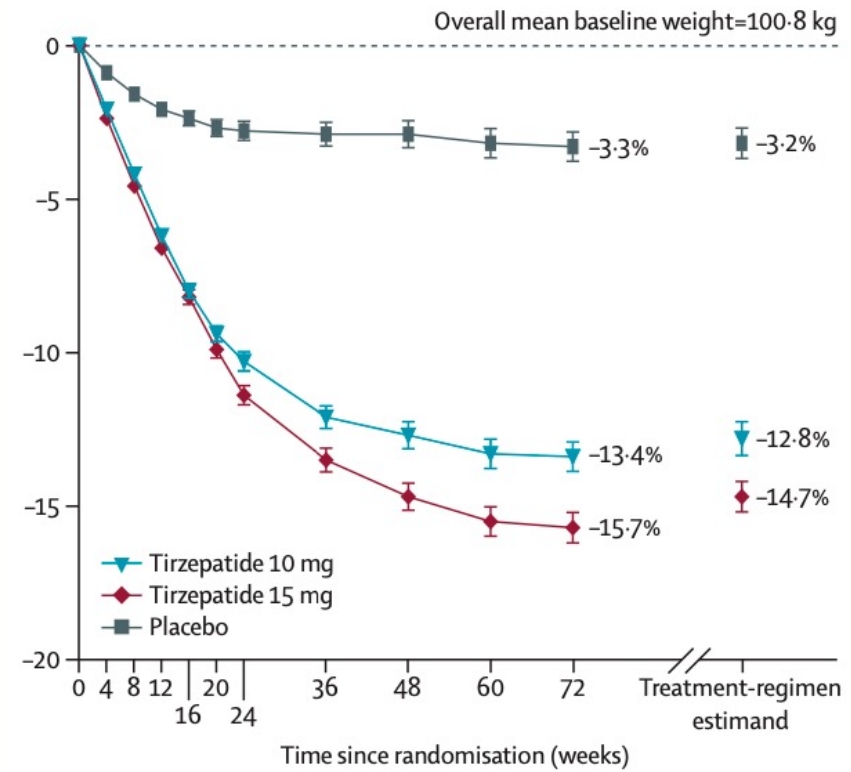


TZP for Treating Obesity in PwO ±T2D

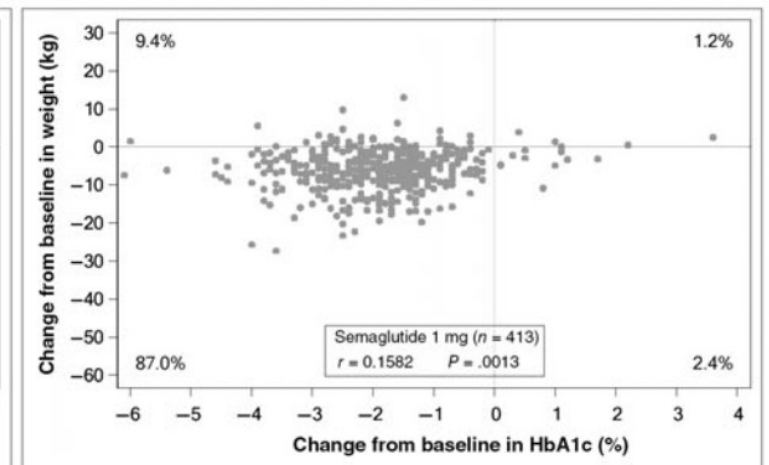
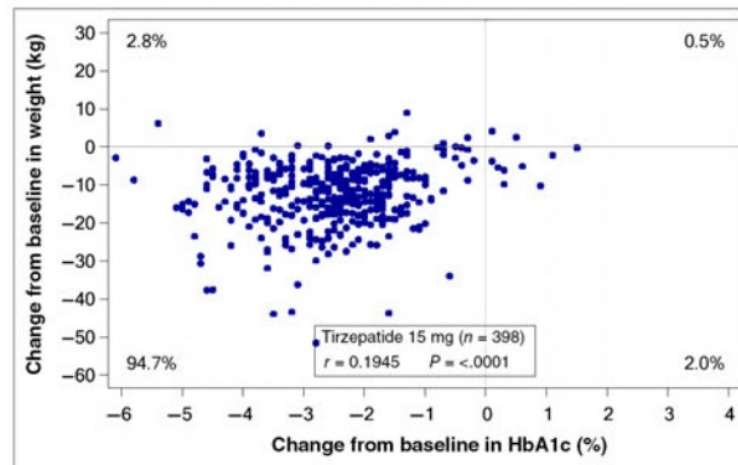
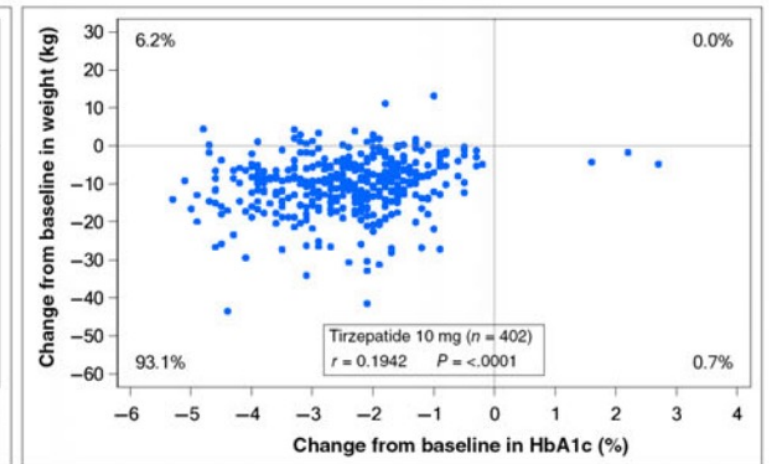
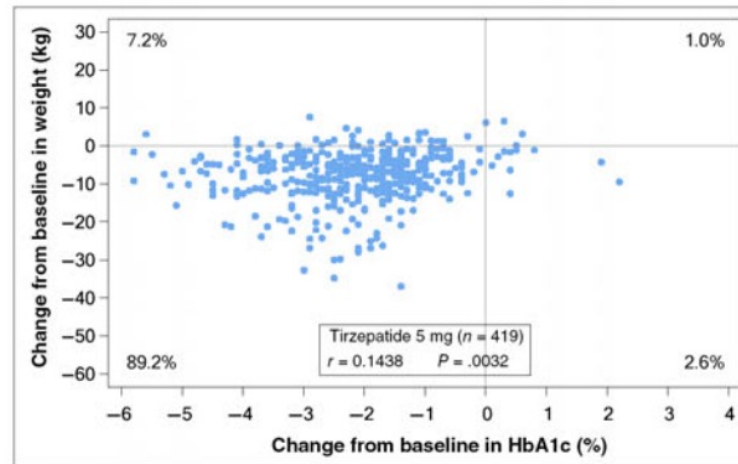
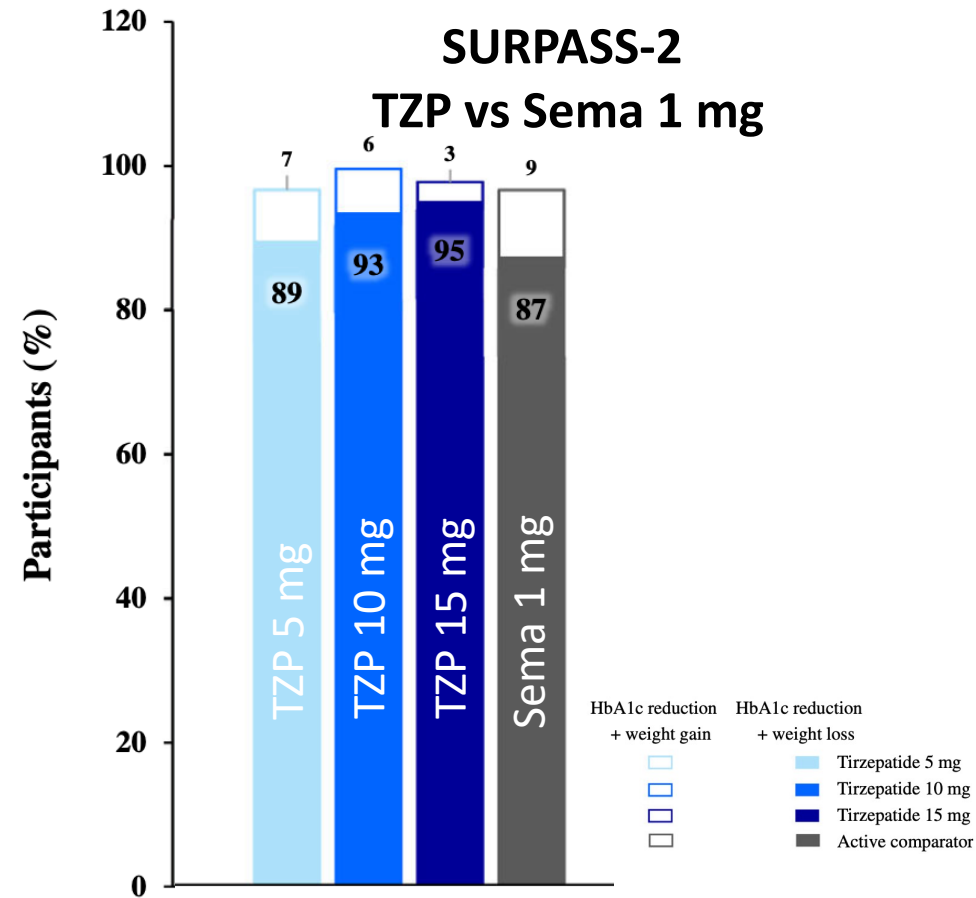
SURMOUNT-1 PwO without T2D



SURMOUNT-2 PwO with T2D



Reduction in Weight Correlates with A1c Reduction with TZP in SURPASS-2, 3, 4



Practical Pearls for Incretin Side Effects



Review the MOA and Anticipate Side Effects

- Eat slowly and stop when hunger disappears
- Don't feed the nausea
- Adjust the dose
- Consider anti-nausea medications

Constipation or Diarrhea

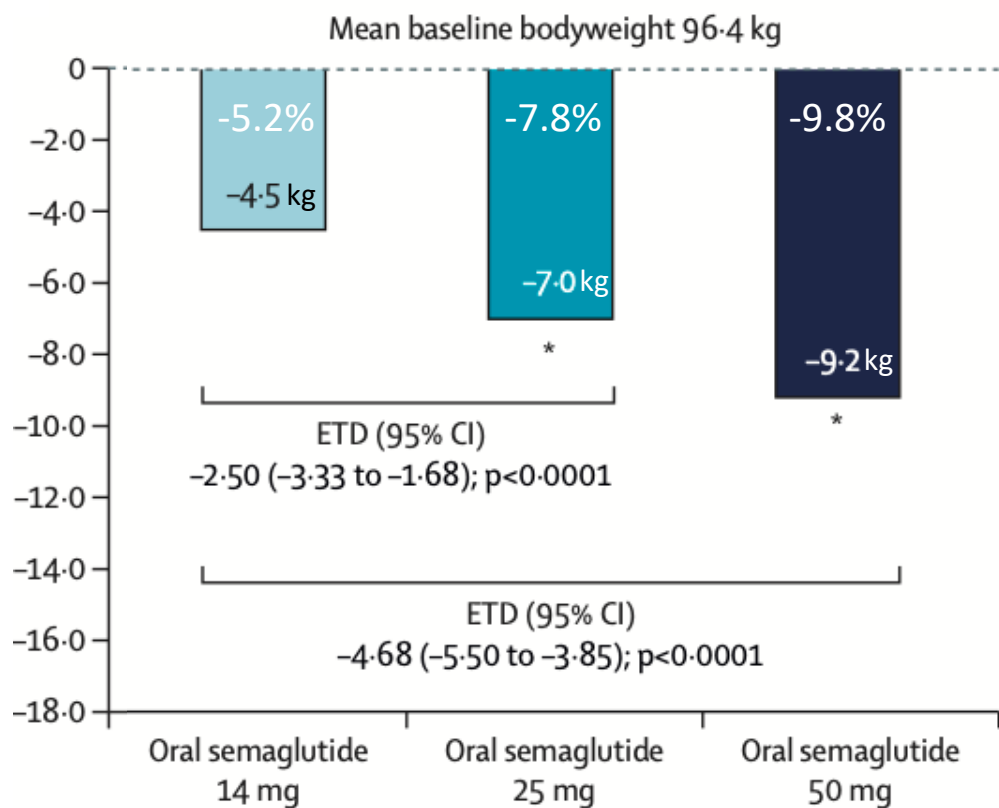
- Be proactive with psyllium fiber
- Consider stool softeners for constipation
- Consider bile acid sequestrant for diarrhea

Abdominal Pain on a GLP-1 RA

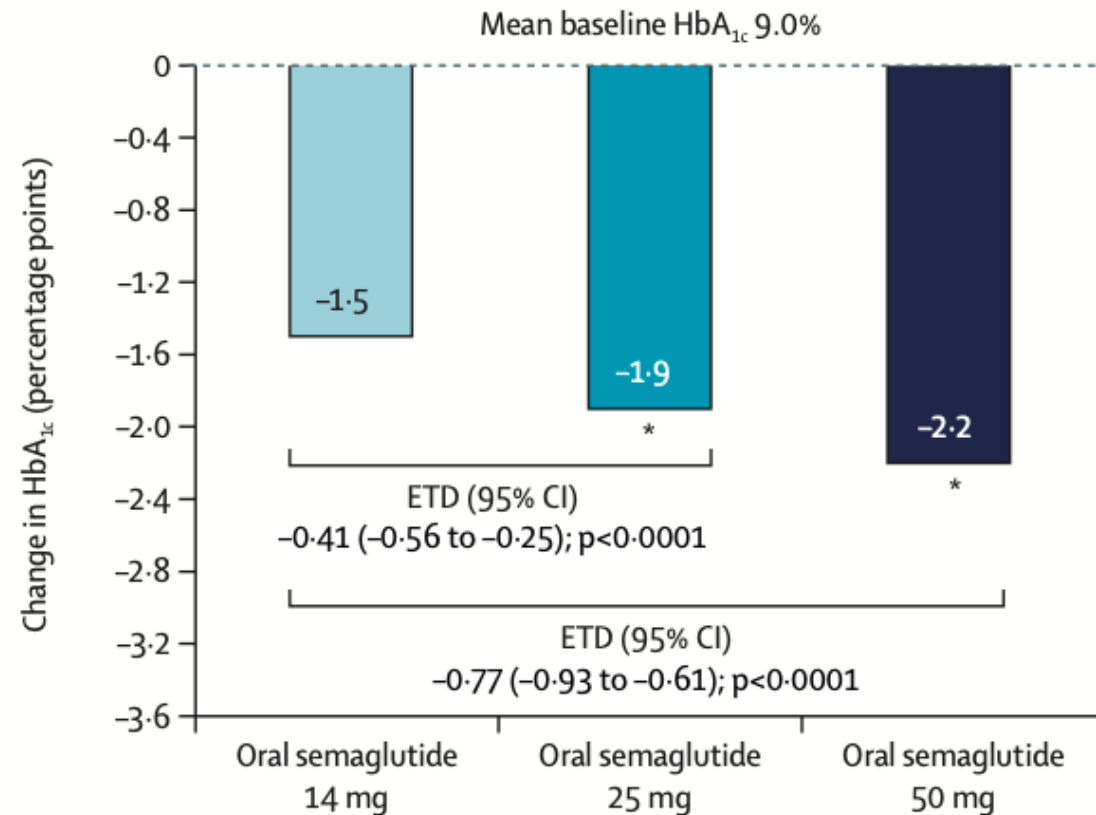
- Is this bloating or pancreatitis?
- Check a lipase, CMP, CBC, UA
- If lipase elevated, stop GLP-1 RA
- If gallbladder present, get RUQ US

Oral Semaglutide 25mg, 50 mg in PwT2D – PIONEER PLUS

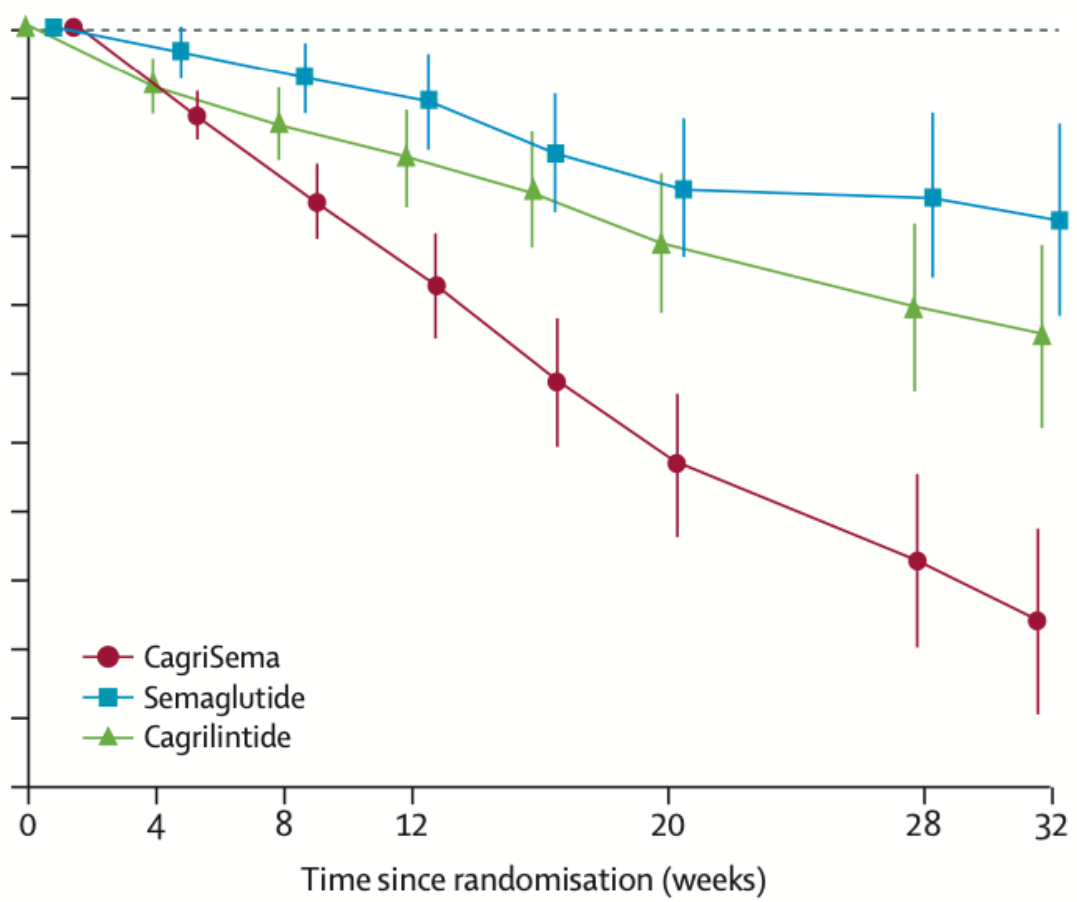
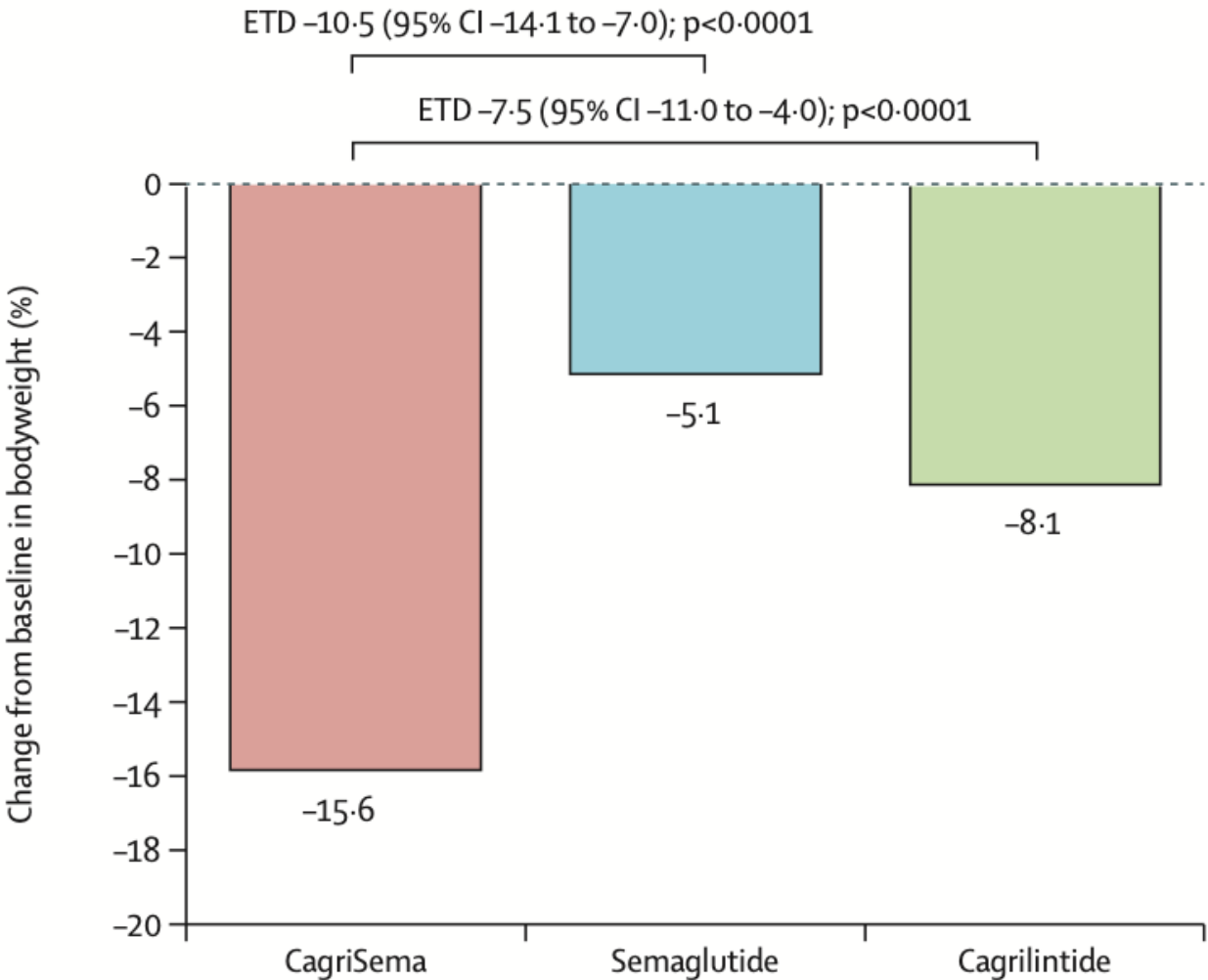
Change in Body Weight



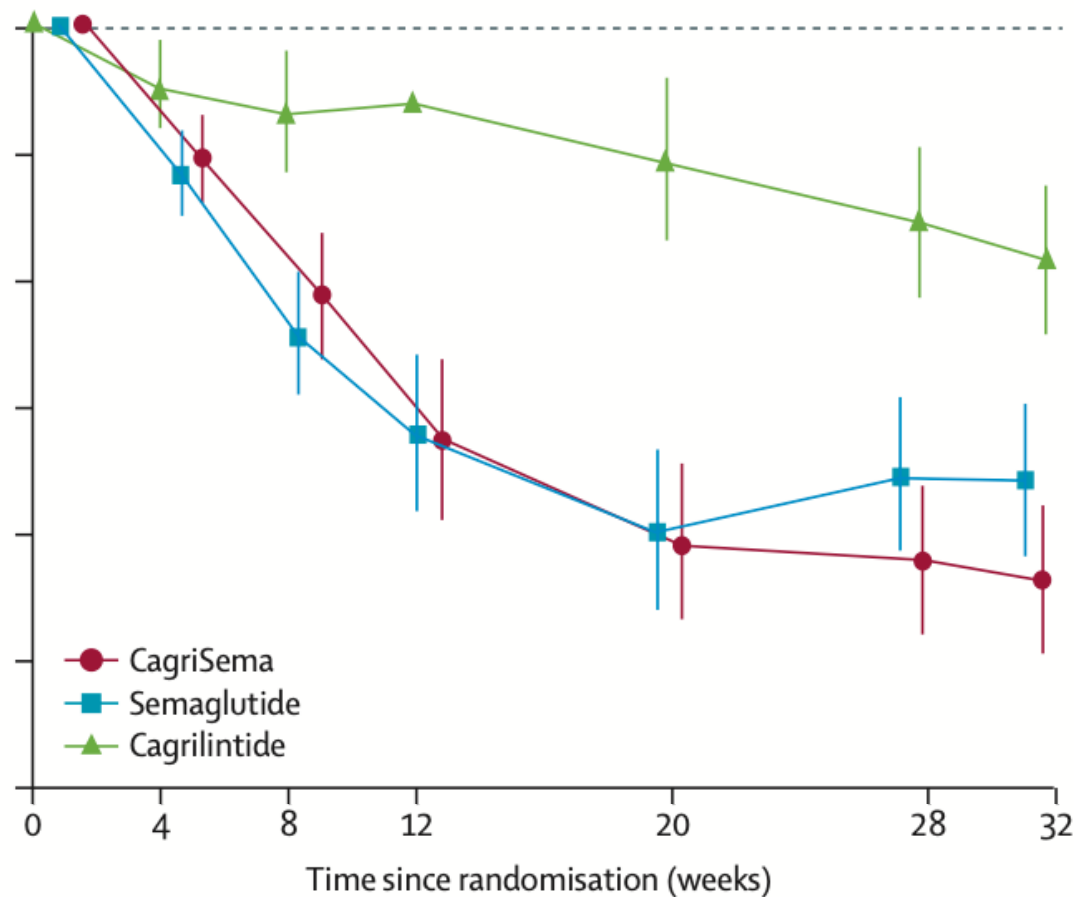
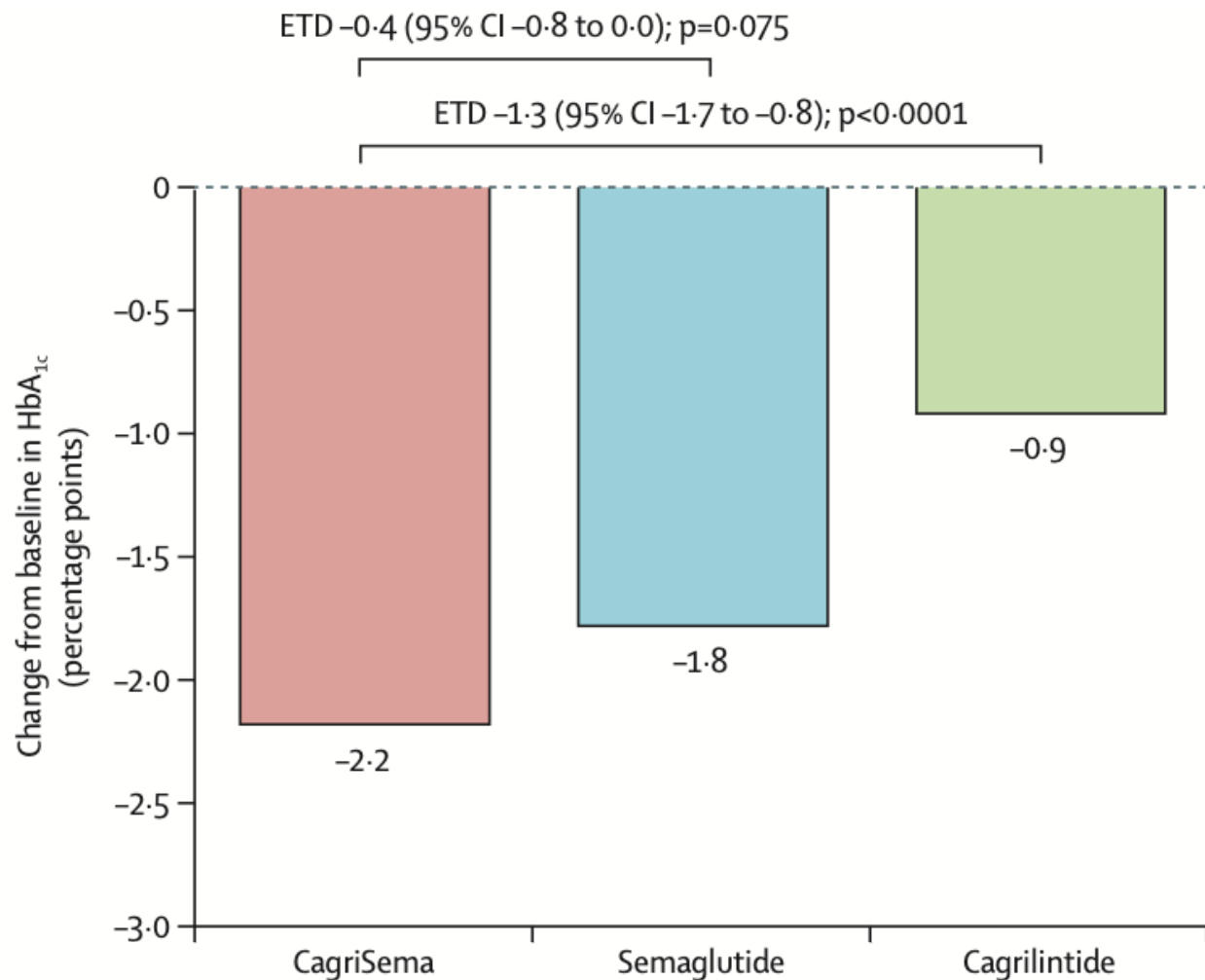
Change in HbA_{1c}



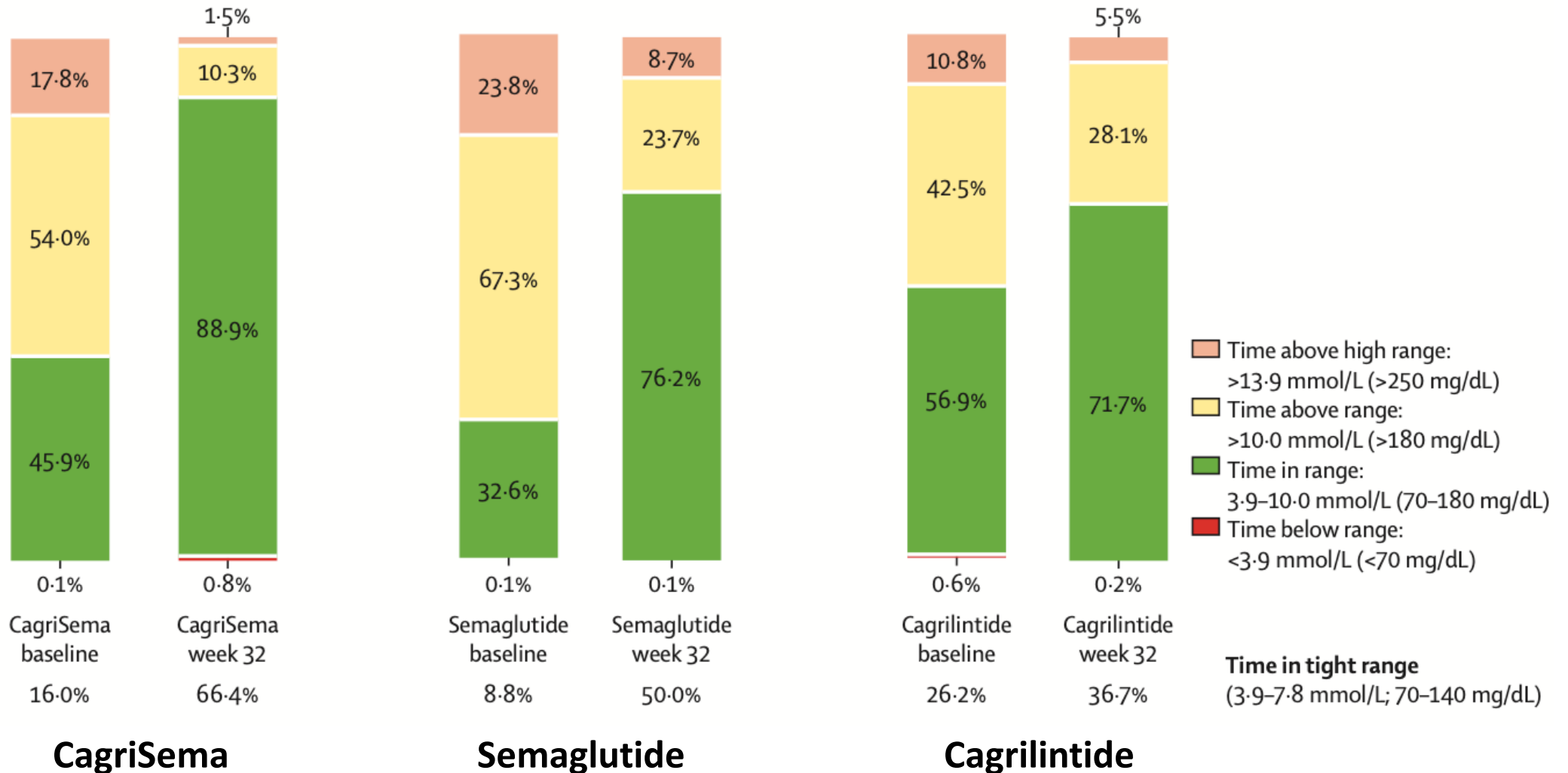
CagriSema vs. Sema vs. Cagrilintide on Weight in T2D



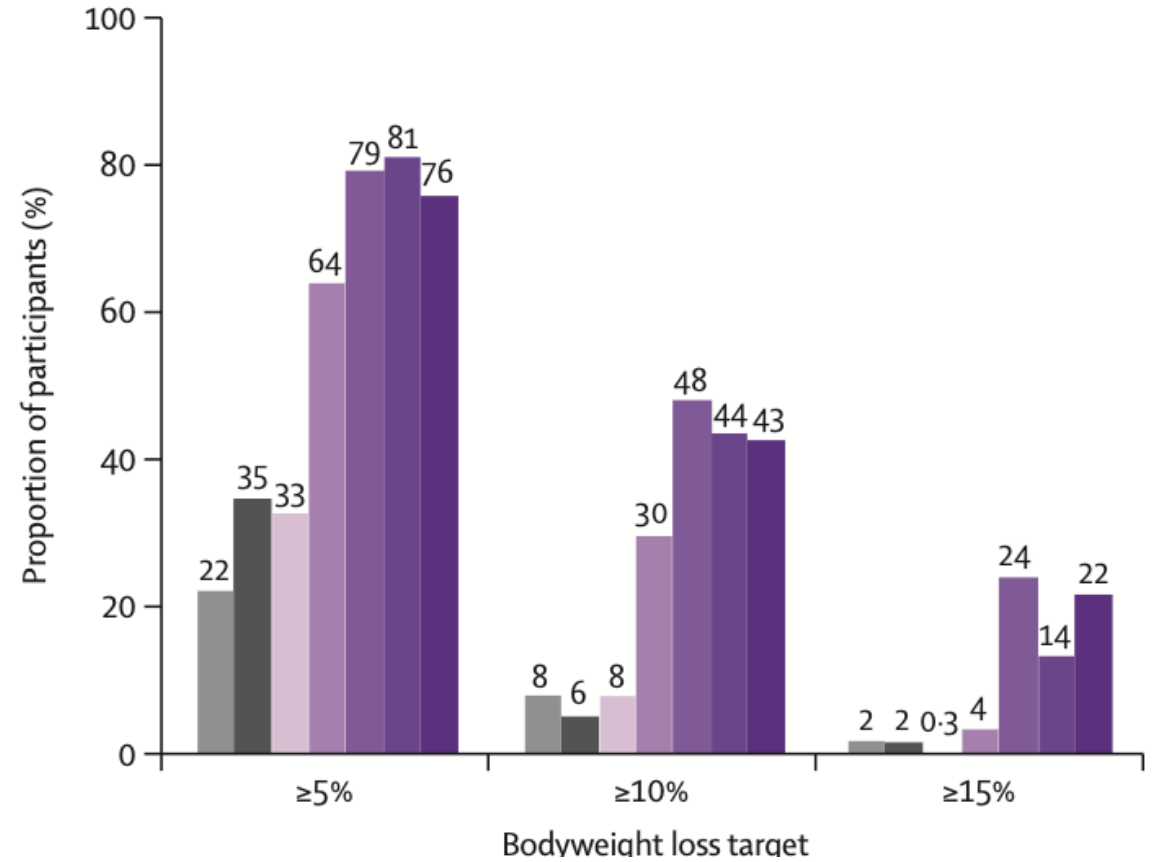
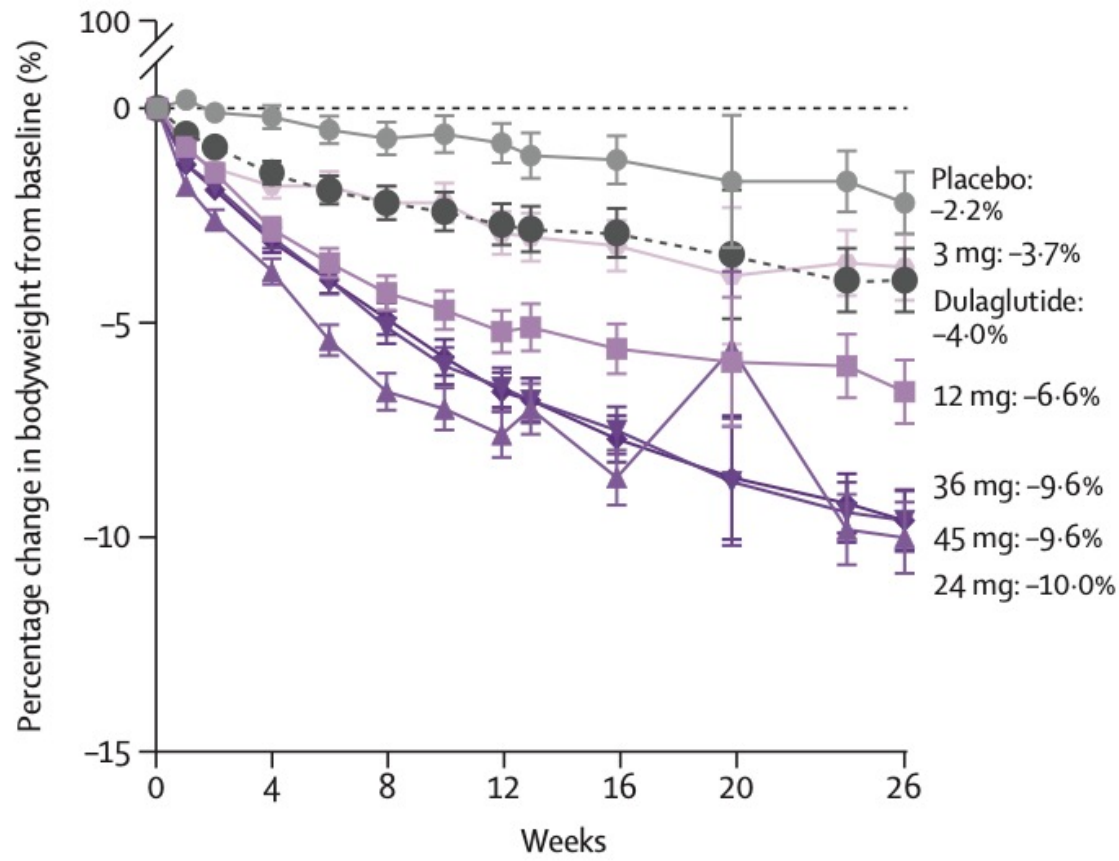
CagriSema vs. Sema vs. Cagrilintide on A1c in T2D



CagriSema vs. Sema vs. Cagrilintide on TIR in T2D

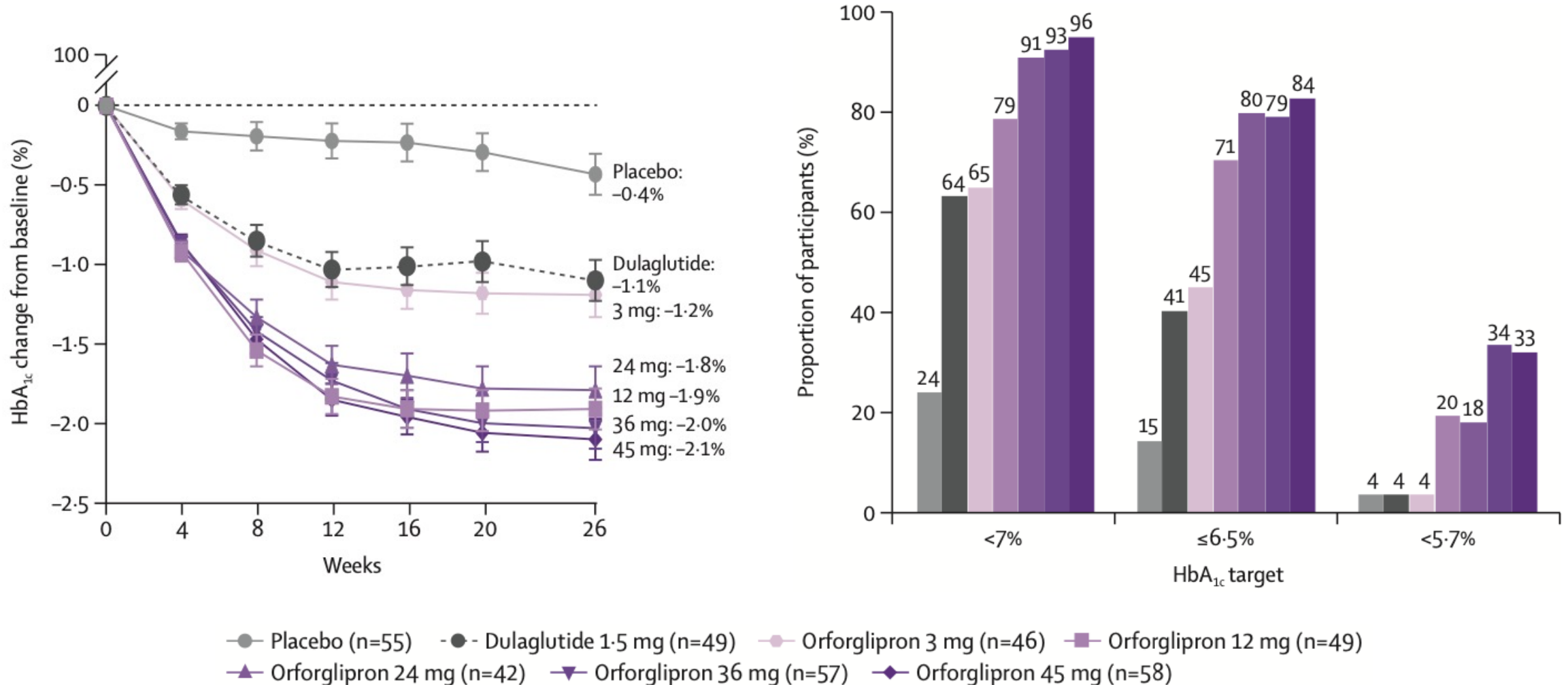


Orforglipron and Body Weight Changes in T2D

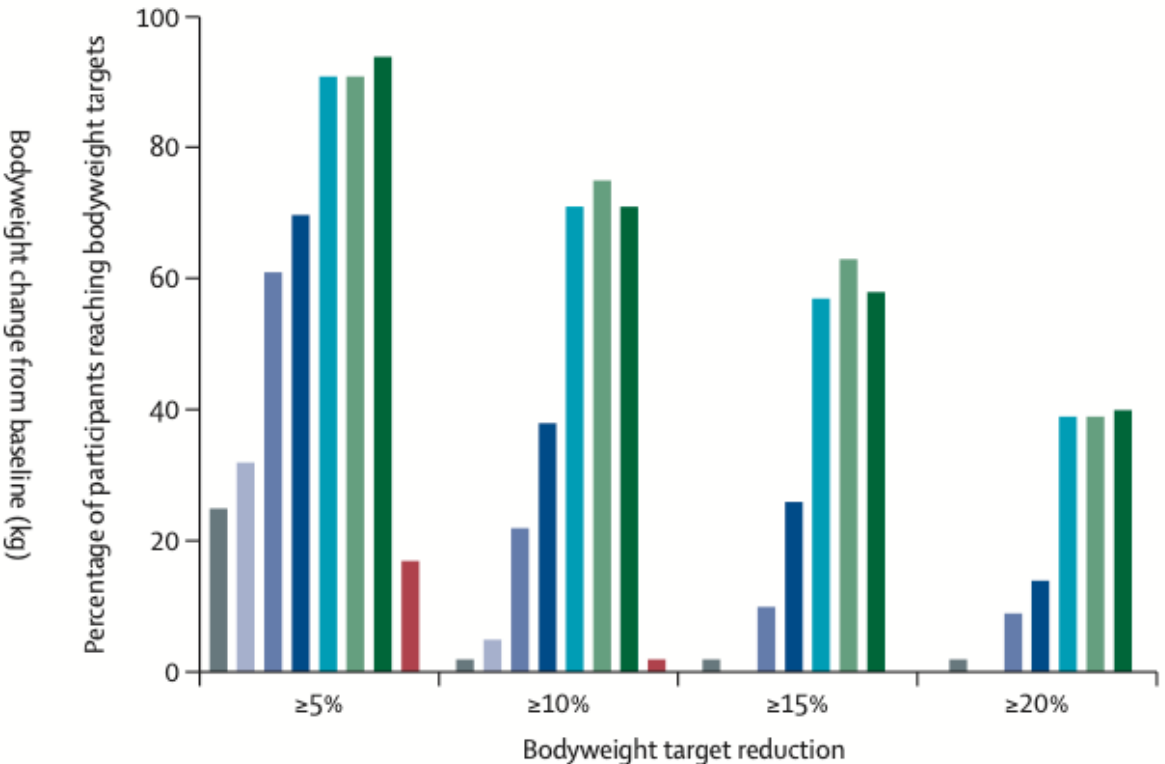
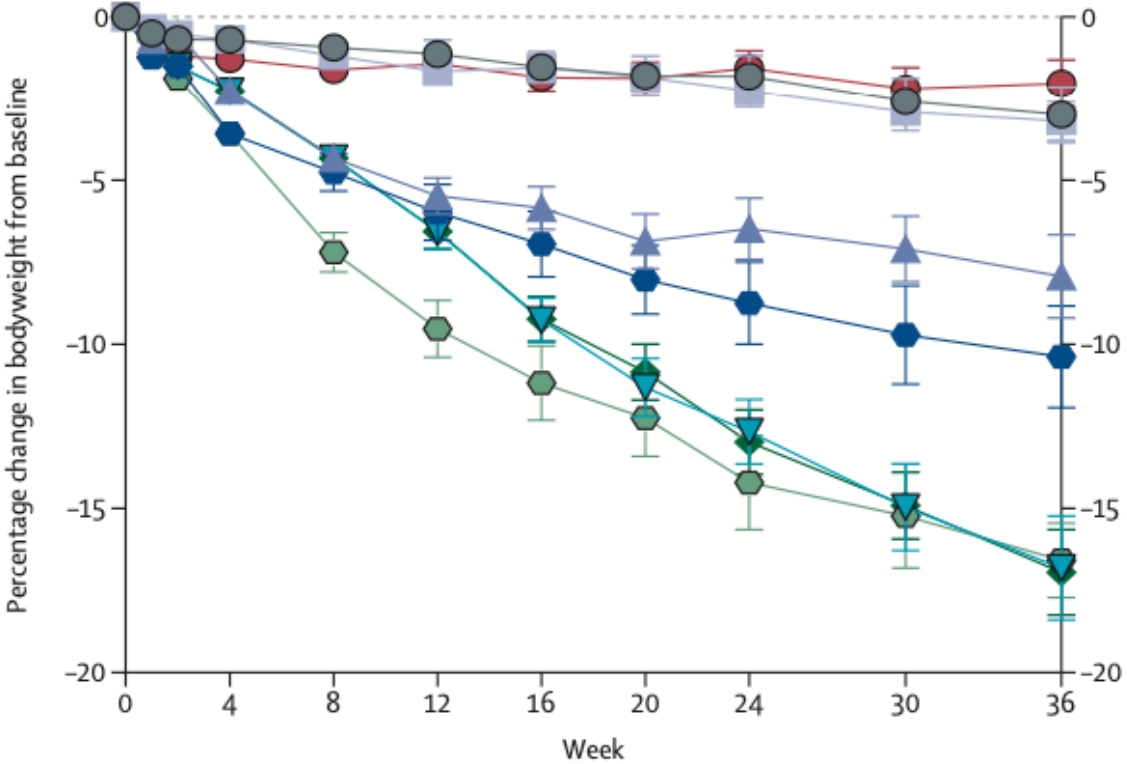


● Placebo (n=55) ● Dulaglutide 1.5 mg (n=49) ● Orforglipron 3 mg (n=46) ● Orforglipron 12 mg (n=49)
 ● Orforglipron 24 mg (n=42) ● Orforglipron 36 mg (n=57) ● Orforglipron 45 mg (n=58)

Orforglipron and A1c Changes in T2D

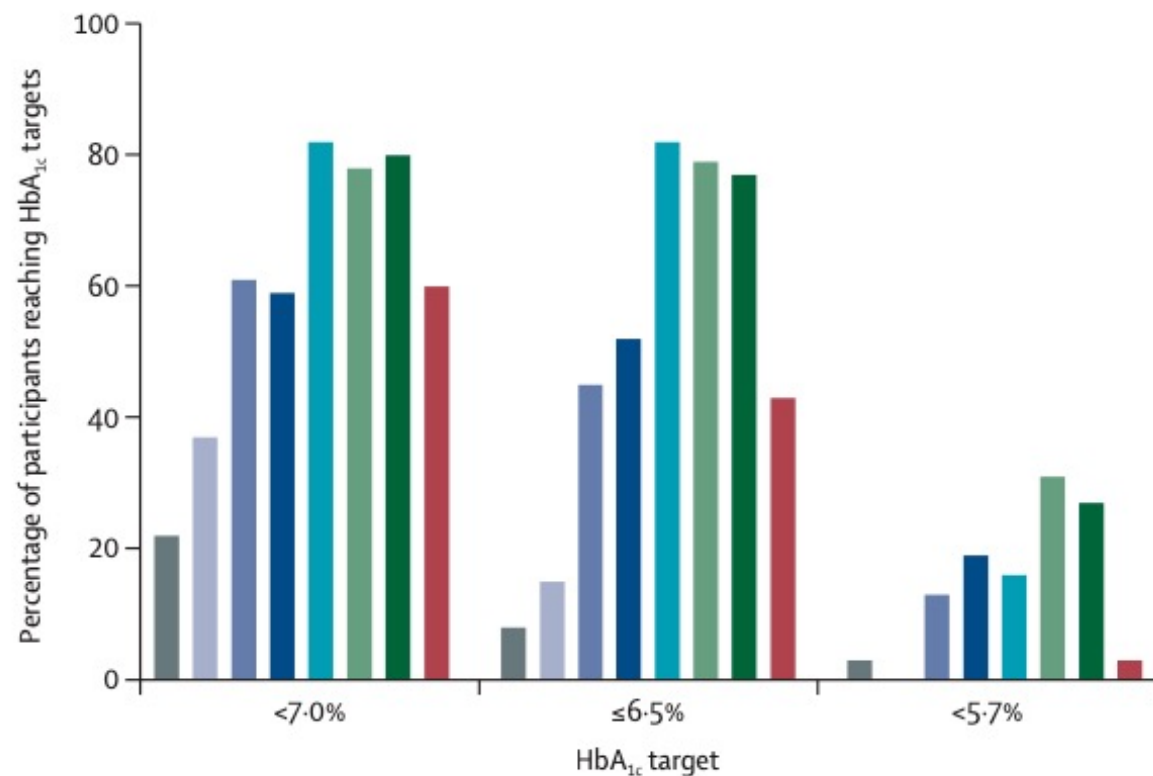
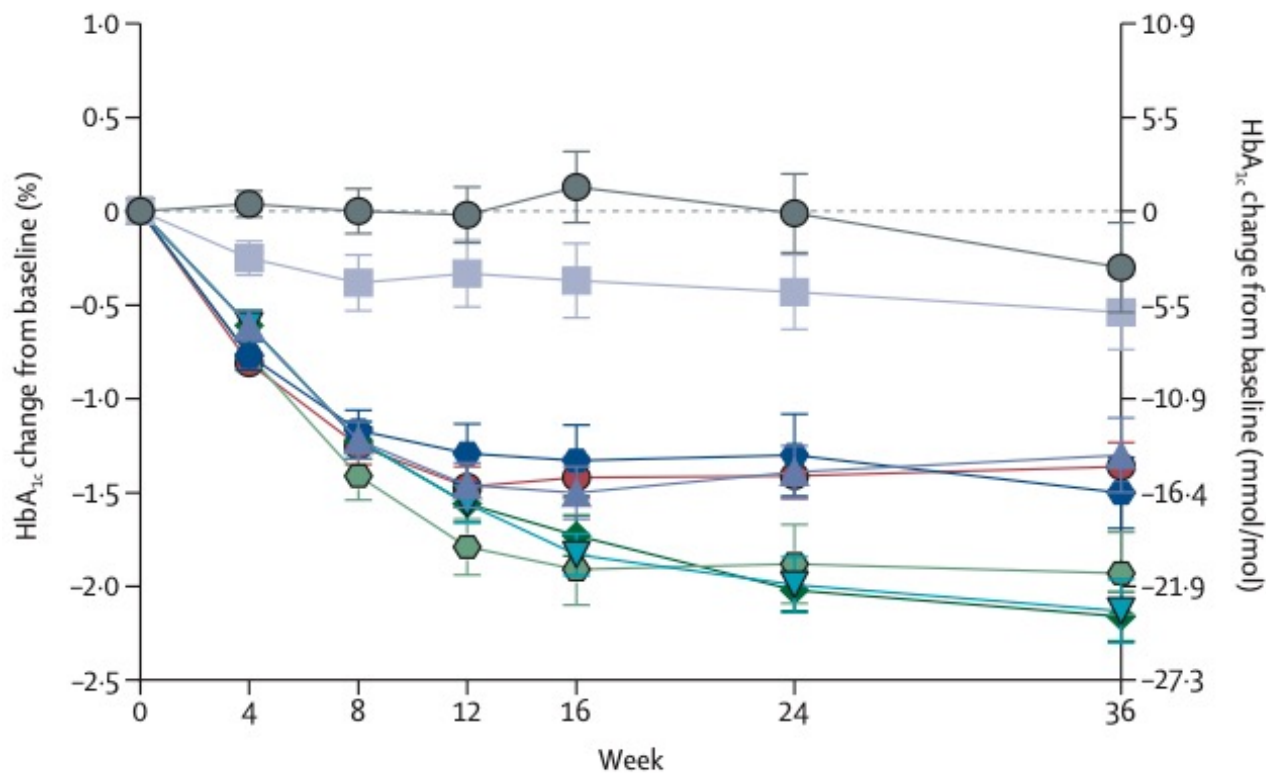


Retatrutide and Body Weight Changes in T2D



● Placebo group ■ Retatrutide 0.5 mg group ▲ Retatrutide 4 mg escalation group* ● Retatrutide 4 mg group ▼ Retatrutide 8 mg slow escalation group†
 ● Retatrutide 8 mg fast escalation group‡ ◆ Retatrutide 12 mg escalation group§ ● 1.5 mg dulaglutide group

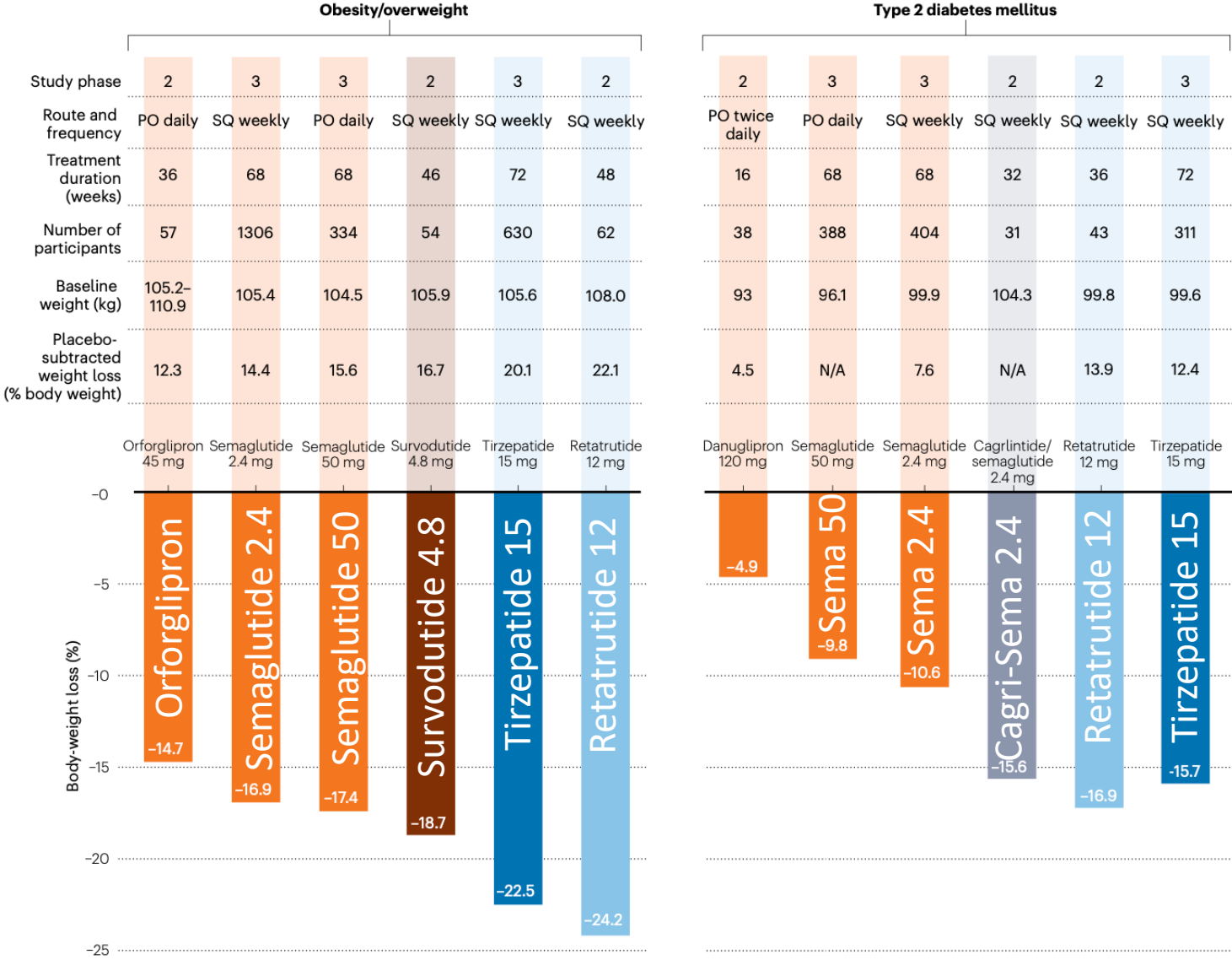
Retatrutide and A1c Changes in T2D



● Placebo group ■ Retatrutide 0.5 mg group ▲ Retatrutide 4 mg escalation group* ● Retatrutide 4 mg group ▼ Retatrutide 8 mg slow escalation group†
 ● Retatrutide 8 mg fast escalation group‡ ◆ Retatrutide 12 mg escalation group§ ● 1.5 mg dulaglutide group

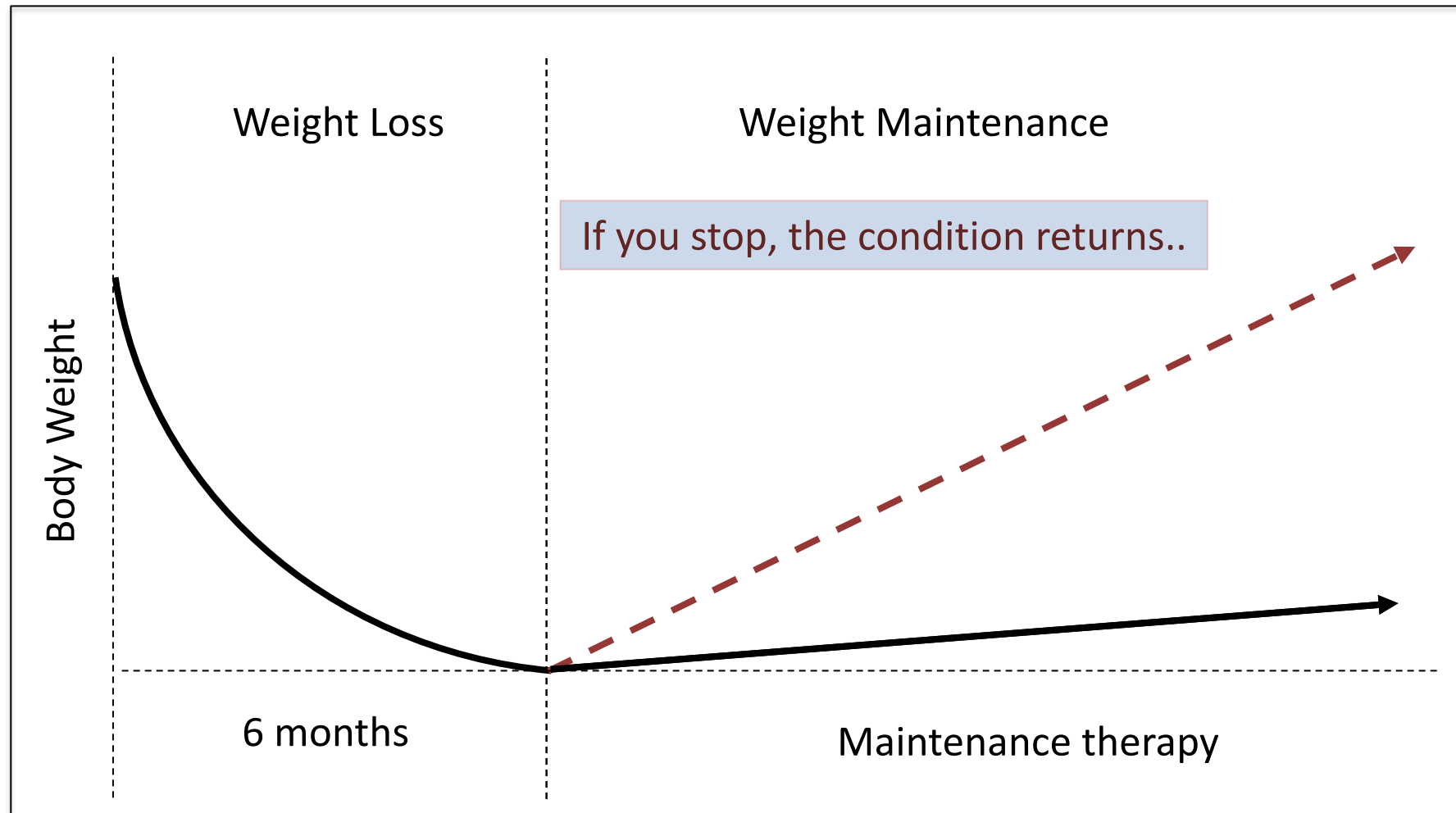
Emerging Next-Generation AOM

■ GLP-1
 ■ GLP-1-GIP
 ■ GLP-1-GCG
 ■ GLP-1-amylin
 ■ GLP-1-GIP-GCG



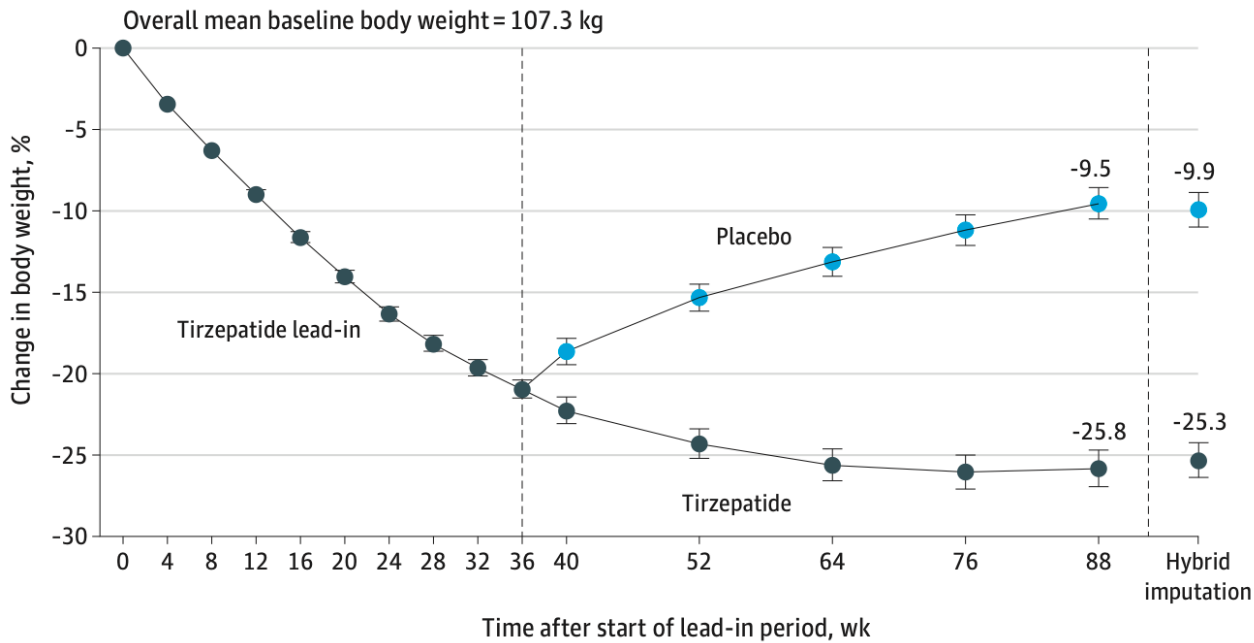
Lingway, I., Agarwal, S. A revolution in obesity treatment. *Nat Med* (2023)

Think of Treating Obesity like Hypertension

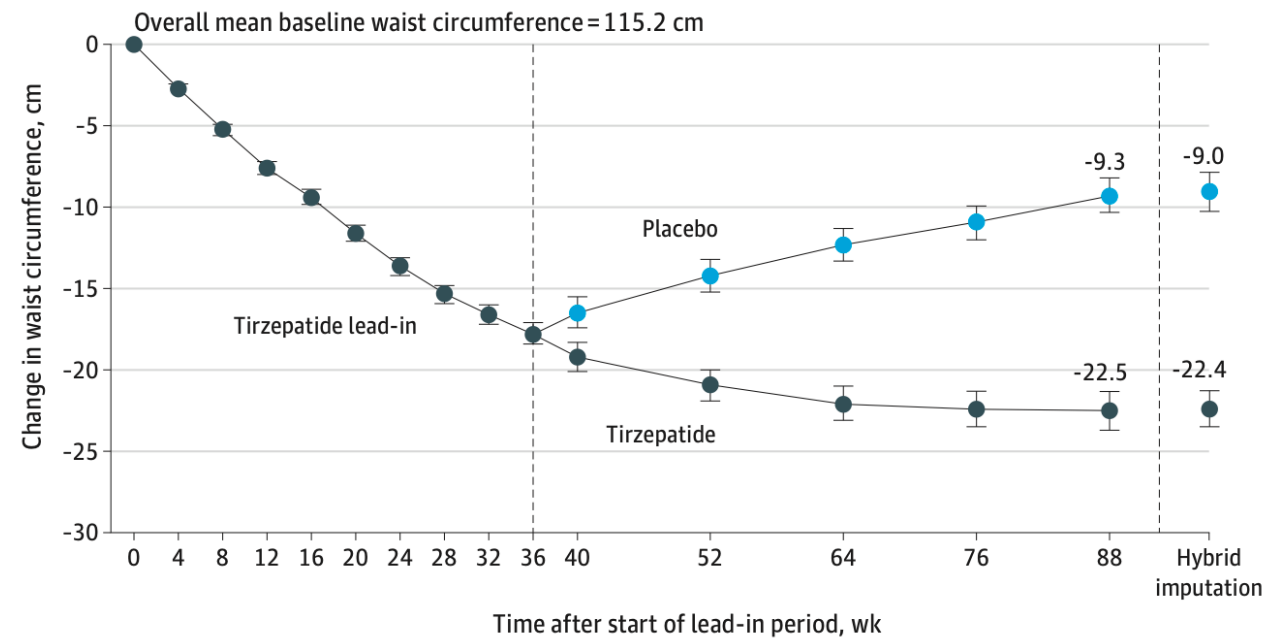


SURMOUNT 4 – Tirzepatide for Obesity

Changes in Body Weight

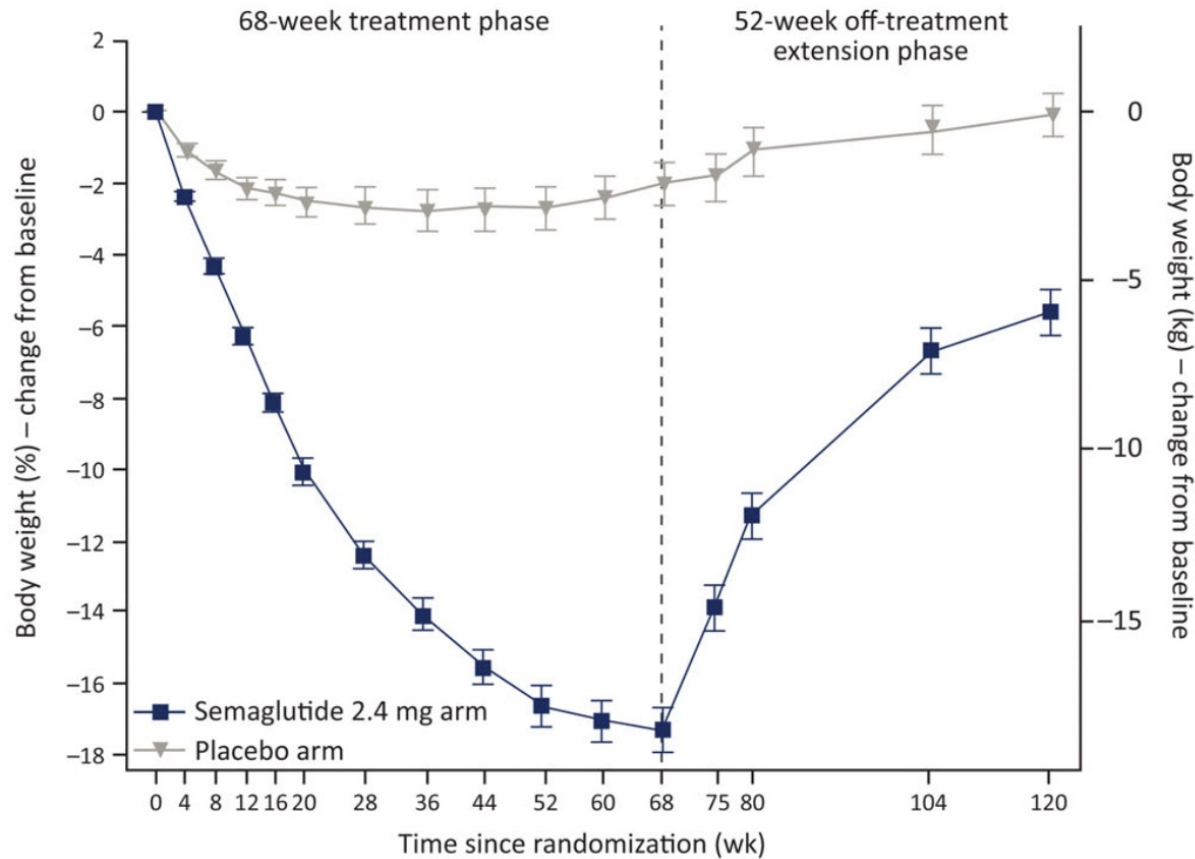


Change in Waist Circumference

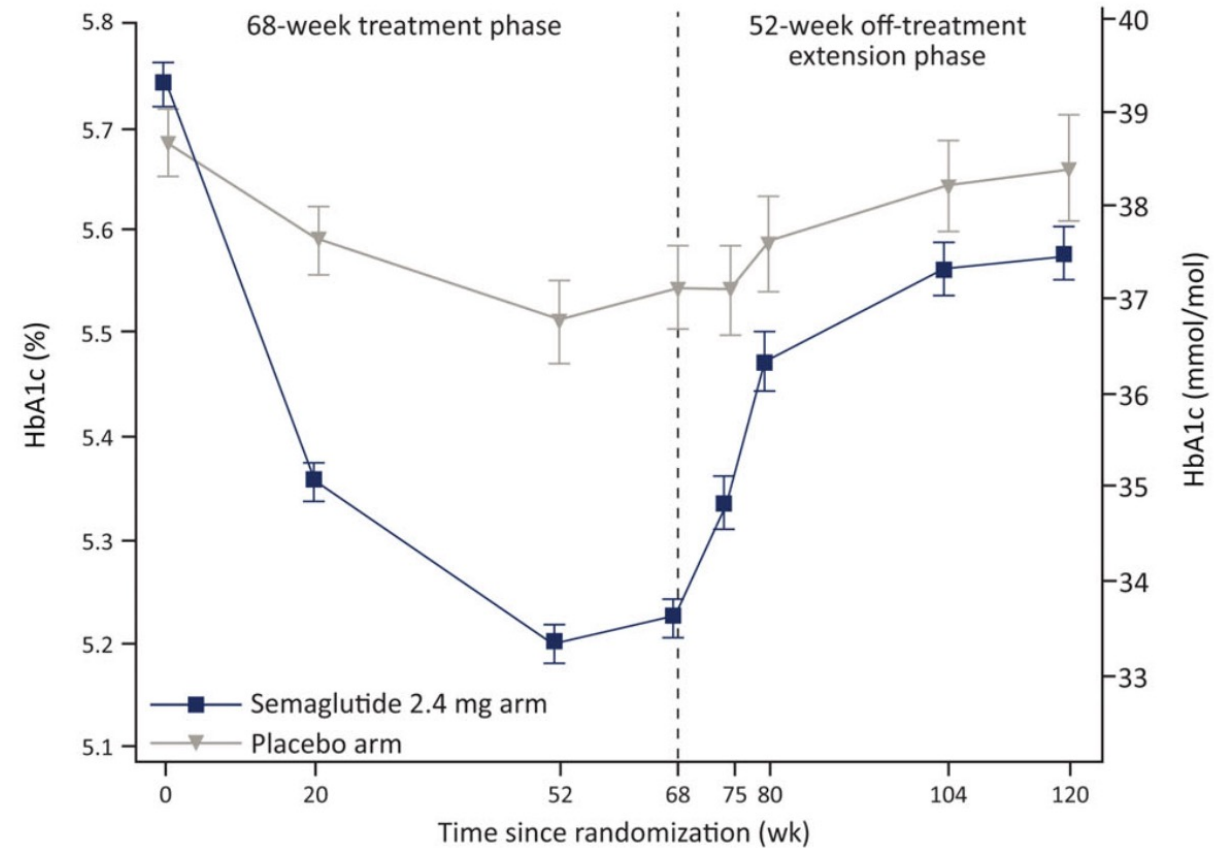


STEP 1 Study Extension - Semaglutide 2.4 mg

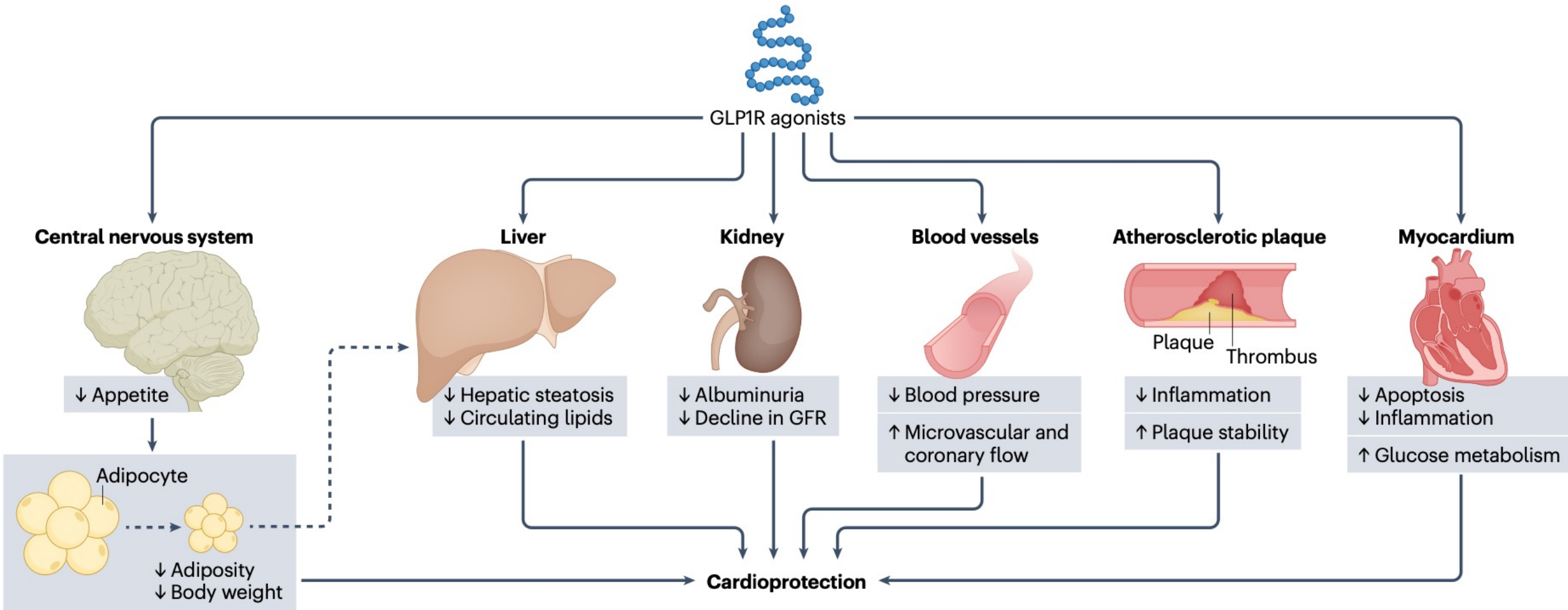
Changes in Body Weight



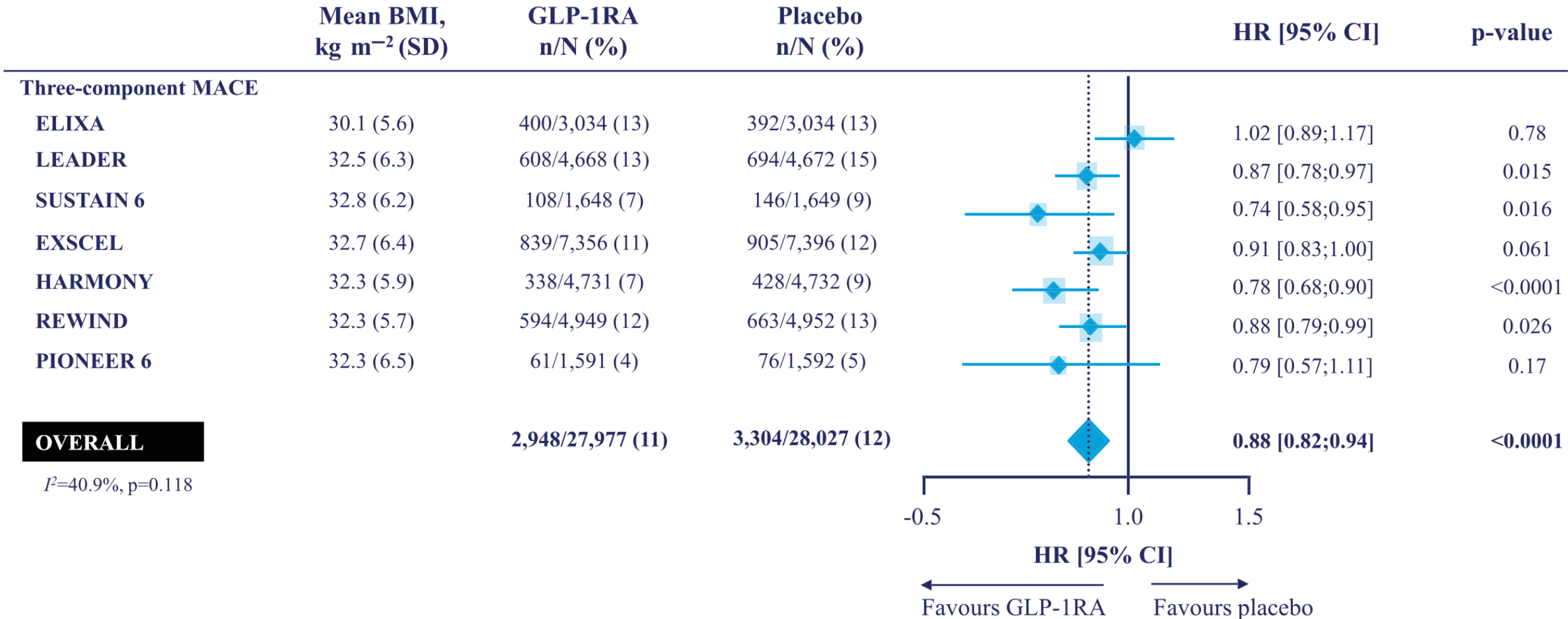
Changes in HbA1c



Direct and Indirect GLP1RA-Mediated Cardioprotection



CV Outcome Trials with GLP-1RA in T2DM



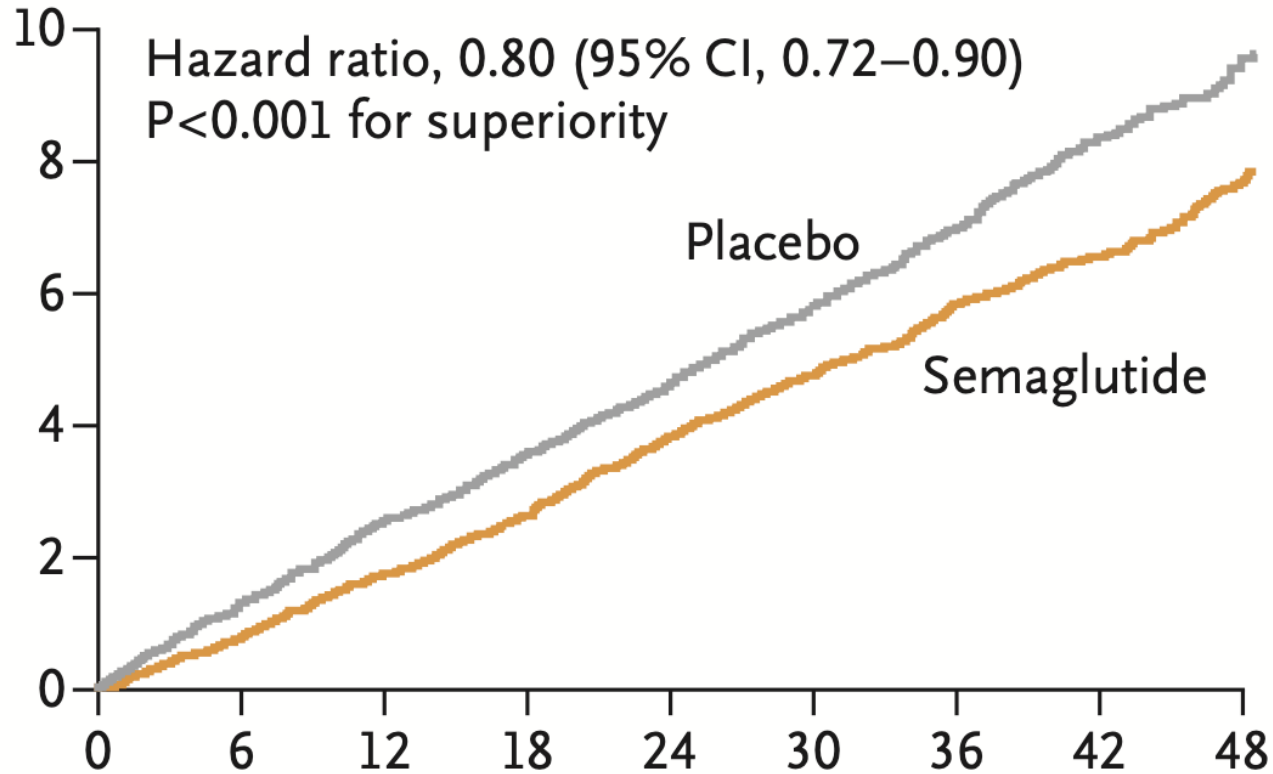
SELECT Trial: Sema 2.4 mg Decreased MACE by 20%

Primary Cardiovascular Composite End Point

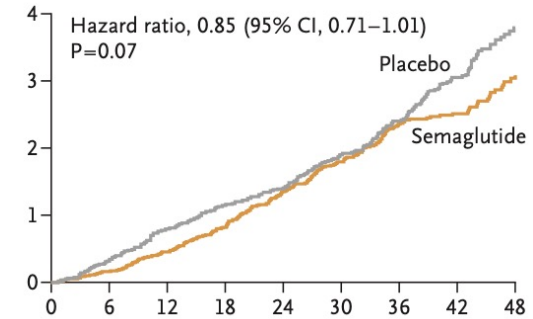
CV death, nonfatal MI, or nonfatal stroke

Hazard ratio, 0.80 (95% CI, 0.72–0.90)

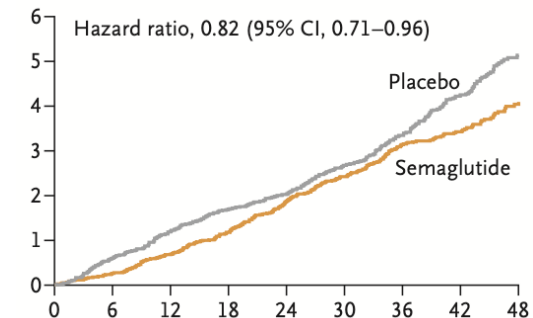
P<0.001 for superiority



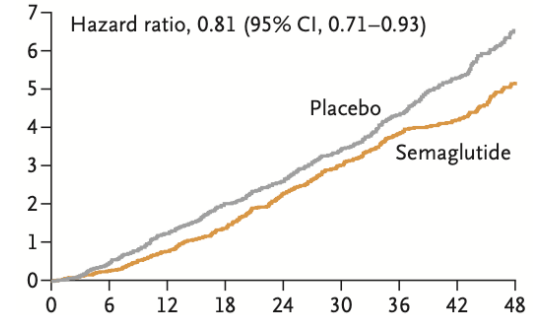
1st Secondary End Point CV Death



2nd Secondary End Point HF Composite



3rd Secondary End Point All Cause Death



SELECT Trial Secondary End Points

End Point	Semaglutide (N=8803)	Placebo (N=8801)	Difference (95% CI)†
Mean change from randomization to week 104			
Body weight — %	-9.39±0.09	-0.88±0.08	-8.51 (-8.75 to -8.27)
Waist circumference — cm	-7.56±0.09	-1.03±0.09	-6.53 (-6.79 to -6.27)
Glycated hemoglobin level — percentage points	-0.31±0.00	0.01±0.00	-0.32 (-0.33 to -0.31)
Systolic blood pressure — mm Hg	-3.82±0.16	-0.51±0.16	-3.31 (-3.75 to -2.88)
Diastolic blood pressure — mm Hg	-1.02±0.10	-0.47±0.10	-0.55 (-0.83 to -0.27)
Heart rate — beats/min	3.79±0.11	0.69±0.11	3.10 (2.80 to 3.39)
EQ-5D-5L index score‡	0.01±0.00	-0.01±0.00	0.01 (0.01 to 0.02)
EQ-5D-VAS score‡	2.52±0.16	0.92±0.16	1.60 (1.16 to 2.04)
High-sensitivity CRP level — %	-39.12	-2.08	-37.82 (-39.70 to -35.90)
Total cholesterol level — %	-4.63	-1.92	-2.77 (-3.37 to -2.16)
HDL cholesterol level — %	4.86	0.59	4.24 (3.70 to 4.79)
LDL cholesterol level — %	-5.25	-3.14	-2.18 (-3.22 to -1.12)
Triglyceride level — %	-18.34	-3.20	-15.64 (-16.68 to -14.58)

Semaglutide 2.4 mg

Weight -9.4%

WC -8 cm

A1c -0.31%

SBP -3.82 mmHg

DBP -1.0 mmHg

HR 3.8 bpm

hs-CRP -39%

TC -4.6%

HDL 4.9%

LDL -5.3%

TG -18.3%

Treating Obesity as Target in T2D



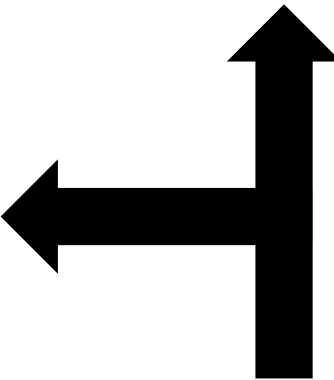
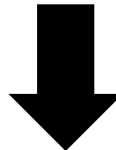
EXCLUDE 2° CAUSES
Medications, Medical, Ψ , Θ

INTEGRATED WEIGHT & GLYCEMIC MANAGEMENT

Nutrition Physical Activity Behavior Change



PHARMACOTHERAPY



BARIATRIC PROCEDURE



Case Discussion

Linda Jones

62-year-old accountant recently discharged following NSTEMI and 3 stents to LAD. BMI 42, BP 138/88, HR 64

PMHx

T2D x 9 years (A1c 9.8), HTN, MAFLD, HLD

Current Meds

Metformin 1000 mg twice daily

Glimepiride 4 mg daily

70/30 Insulin 15 units twice daily

Rosuvastatin 20 mg daily

Metoprolol 25 mg twice daily

Losartan 100 mg daily

Clopidogrel 75 mg daily



Case Discussion

Linda Jones

62-year-old accountant recently discharged following NSTEMI and 3 stents to LAD. BMI 42, BP 138/88, HR 64

PMHx

T2D x 9 years (A1c 9.8), HTN, MAFLD, HLD

Current Meds

Metformin 1000 mg twice daily

~~Glimepiride 4 mg daily~~ → **Empagliflozin 10 mg daily**

~~70/30 Insulin 15 units~~ → **Semaglutide 0.25 mg weekly**

Rosuvastatin 20 mg daily

Metoprolol 25 mg twice daily

Losartan 100 mg daily

Clopidogrel 75 mg daily



Case Discussion

Linda Jones

62-year-old accountant

BMI 42 -> 34, BP 115/74, HR 64

PMHx

T2D x 9 years (A1c 6.8), HTN, MAFLD, HLD

Current Meds

Metformin 1000 mg twice daily

Empagliflozin 10 mg daily

Semaglutide 2.4 mg weekly

Rosuvastatin 20 mg daily

Metoprolol 25 mg twice daily

Losartan 100 mg -> 25 mg daily

Clopidogrel 75 mg daily



Post-Test Question

Which of the following Food and Drug Administration (FDA) approved anti-obesity medications is associated with the greatest mean weight loss?

- a. Phentermine 15 mg daily by mouth
- b. Liraglutide 1.8 mg daily by subcutaneous injection
- c. Semaglutide 2.4 mg weekly by subcutaneous injection
- d. Semaglutide 14 mg daily by mouth
- e. Retatrutide 8 mg weekly by mouth



Please answer today's CME questions at [menti.com](https://www.menti.com)



Menti.com
CODE:
33801580

Post-Test Question

Which of the following Food and Drug Administration (FDA) approved anti-obesity medications is associated with the greatest mean weight loss?

- a. Phentermine 15 mg daily by mouth
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- c. Semaglutide 2.4 mg weekly by subcutaneous injection**
- d. Semaglutide 14 mg daily by mouth
- e. Retatrutide 8 mg weekly by mouth

Answer: c. Semaglutide 2.4 mg weekly by subcutaneous injections is the FDA-approved anti-obesity medication (AOM) in this list with the greatest mean weight reduction. Phentermine 15 mg is the only other FDA-approved AOM in the list and is associated with ~5-8% mean weight loss. Liraglutide 3 mg, and not 1.8 mg, daily is an approved dose for treating obesity. Oral semaglutide 14 mg is approved for treating type 2 diabetes and not obesity. Retatrutide is currently under investigation for treating obesity.

Diabetes and Obesity – Where Do We Fail?



Excess and dysfunctional adiposity is strongly linked to the pathogenesis of T2D. Until recently, glucose has been the primary treatment target



Improvements in glycemia, T2D remission, cardiometabolic outcomes and mortality correlate with weight loss, which is highly variable



Neither AOM nor surgery are curative for T2D or obesity – there are CV and other health benefits that may be independent of weight loss



Advocacy is needed to treat obesity as target in T2D. New incretin therapies and bariatric surgery improve glycemia, weight and CV health

@JaimeAlmandoz



Thank you!

Jaime Almandoz, MD, MBA, MRCPI, FTOS

Section Chief, Weight Wellness and Obesity Medicine

Associate Professor of Internal Medicine

Division of Endocrinology and Metabolism

UT Southwestern, Dallas, Texas, USA



UT Southwestern
Weight Wellness